Pit and Quarry

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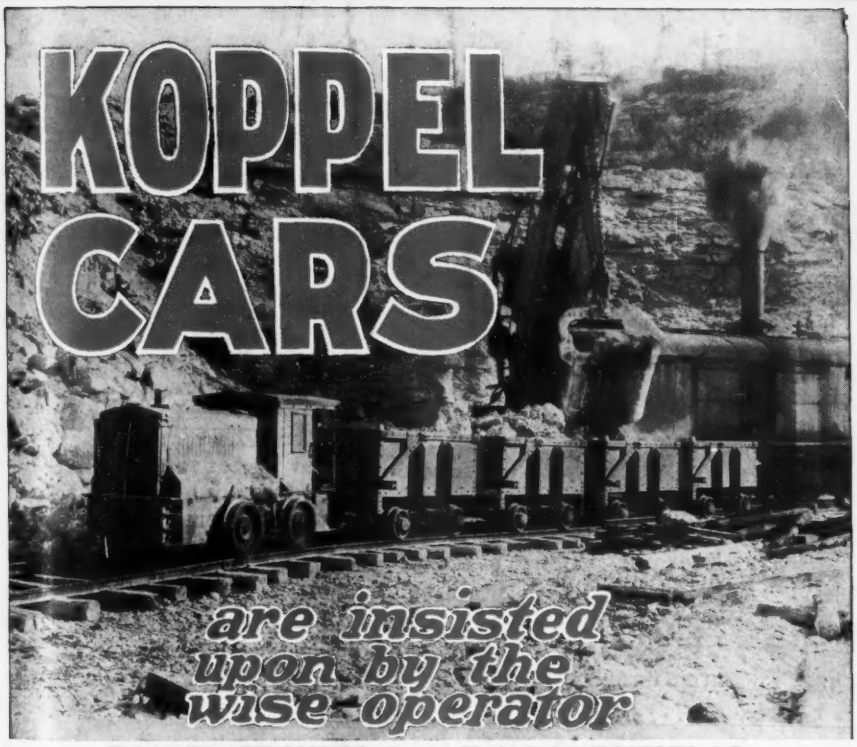

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Pittsburgh New York Chicago San Francisco

April 15, 1926

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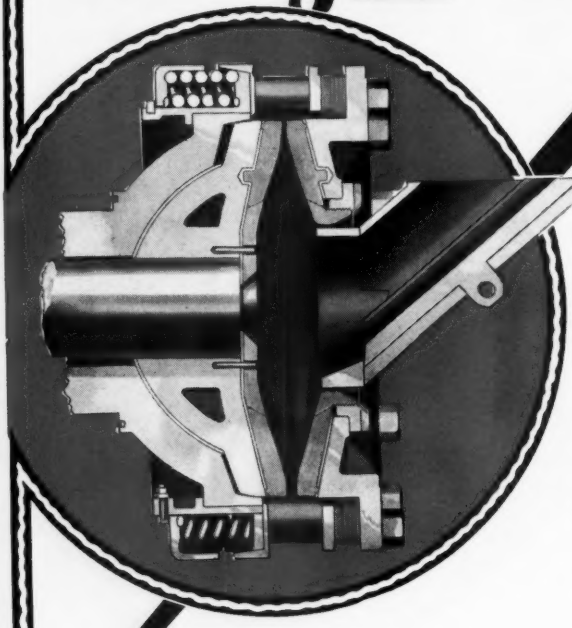

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Pit and Quarry

A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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Vol. 12 CHICAGO. ILL., APRIL 15, 1926 No. 2

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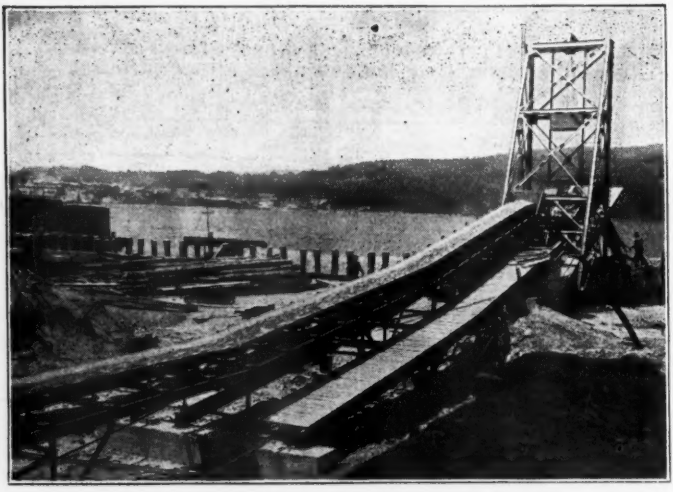

Arno Belt equipped conveyor to wharf for loading Hudson River barges at the Verplank Plant of the New York Trap Rock Corp.

How One of the "Big Ones" Achieves Material Handling Efficiency

THE New York Trap Rock Corporation is noted for the efficiency of its operations both at the Verplank Plant shown above and at the Cedar Cliff plant shown below at the right. At both these big modern plants satisfactory, continuous and efficient service is rendered by

ARNO BELTING

At the Cedar Cliff plant a seven ply Arno Belt, 42 inches wide and having a $\frac{5}{16}$ inch covering on both sides was installed a year ago for conveying material from the primary jaw crusher to the secondary crusher. This belt was run all of last season on one side and was turned over this year. The side used last year shows very little wear and is still good for several years' service.

Write for Complete Information

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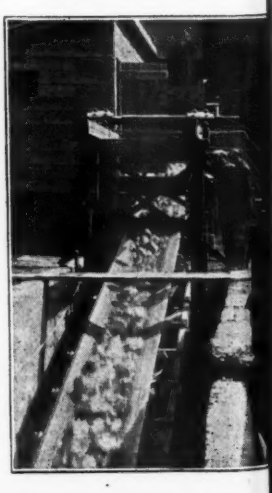
Cincinnati Rubber Mfg. Co.
CINCINNATI, OHIO

Below is shown an Arno Belt equipped conveyor at the Cedar Cliff Plant of the New York Trap Rock Corp.



Pit and Quarry

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Depreciation and Your Tax

By M. P. Snow

THOUSANDS of dollars in taxes have been saved to manufacturers by several very recent decisions on depreciation by the United States Board of Tax Appeals.

Before telling about the actual content of these rulings, though, let me say that the Board of Appeals operates independently of the income tax administration which is a part of the United States Treasury. The Board is responsible only to the President and it is a sort of supreme tax court, passing judgment both on the income tax authorities and the taxpayers. And, the Board has been making decisions at the rate of about two a day since its creation back in June of 1924.

In the findings or decisions of the Board, depreciation rates to be allowed to manufacturers on their buildings, plants and equipment are given considerable attention and study. Obviously the most important single point brought out is that the deduction taken for depreciation must be reasonable.

Of all the decisions made by the Board, however, the one of most urgent interest and value to manufacturers is a recent finding which permitted a large manufacturer to take nearly three times the regular rate of depreciation on his machinery. In this instance the taxpayer claimed that on account of the market he was forced to speed up his machinery and use a poorer grade of material in order to supply a large demand for his product. The increased vibration caused by operating at a higher speed than usual brought about a greater amount of wear and tear on the building and machinery. The poorer quality of raw material he was using increased the strain on the machinery which likewise helped to shorten its life. Besides this, a number of his best employees left him to go into business for themselves or to engage in better-paying employment with competitors. The new men, hired to replace them, caused a great deal of additional wear and tear on the equipment because of their lack of experience and skill in this particular work.

Having proved all these things to the satisfaction of the Board of Appeals, the manufacturer was allowed to take a rate of depreciation almost three times as great as he took in previous years, both on his machinery and building. Of course, it is logical that all these conditions did shorten the life of the property used. All that the manufacturer needed to do was to prove it to the Board.

Salt spray blown in by the wind rusted certain equipment and tracks of another manufacturer whose case was recently passed on by the Board. The plant was located near a body of salt water. The taxpayer contended that the spray caused his tracks and equipment to become useless in a shorter time than the same property would if located inland. The Board allowed the increased rate of depreciation when satisfactory evidence showing the real conditions was presented.

Buildings and equipment located near a railroad where as many as thirty heavy trains passed every day were claimed by a certain manufacturer or to have a higher rate of depreciation because of their location. He showed that his property was subjected to the vibration caused by the heavy trains and stated that it so affected the machinery that it could not be properly adjusted, and the useful life was thus considerably shortened. After careful review of the facts, the Board allowed the rates claimed by this manufacturer.

In all of the instances just mentioned, unusual rates were allowed where common sense showed that they were justified. However, manufacturers claiming higher depreciation have in a surprising number of cases presented practically no evidence to support their arguments. The Board has disallowed a great many claims for higher depreciation rates because of "lack of proof." Now, a manufacturer is the one to know whether there is an unusual wear and tear on his machinery, but the testimony of an expert on buildings or machinery will carry a great deal more weight than the taxpayer's own personal opinion. If someone tried to sell a manufacturer a building and plant he would insist in most cases on an appraisal by competent experts. Still, the Board has been virtually forced to turn down a number of cases because the only thing back of the claim was the personal opinion of one of the officers or of some employee who could not possibly qualify as an expert in such matters.

One of the most frequent causes of disputes between taxpayers and the tax administration is the question of depreciation on buildings. There are so great a number of facts to be taken into consideration in each case, which is seldom exactly like any other case, that to a casual observer the decisions may seem inconsistent.

At this point, let me urge that if there is anything peculiar or unusual about the conditions surrounding the wear and tear on your buildings, plant or machinery, take advantage of it. So long as you can submit reasonable proof to support a claim for increased depreciation, you will find Uncle Sam willing to meet you half way, to relieve you of any burdens you obviously should not carry. Now there are several different methods of taking depreciation. Some use what is known as the "declining balance" basis. For example, if a manufacturer decides that a certain machine will last ten years he will take 10 per cent as depreciation the first year, deduct the amount from the cost on the books, then take 10 per cent on the remaining amount of cost the next year, deduct it and so on through the rest of the life of the asset.

Those manufacturers, however, who carry a reserve for depreciation on their books take 10 per cent each year on the original cost of the machine. In the first case, the "declining balance" method, it will take about seventeen years to write the machine off the books by depreciation at the rate used. However, in the second instance, the plan requires just ten years to recover the cost of the asset. Therefore, those who figure depreciation by the first method are really taking only about 6 per cent a year instead of the 10 per cent they usually think they are deducting. A larger tax results, because they are deducting less than they are entitled to in figuring their tax liability.

Just a word now about inventories. Manufacturers have as many problems as any taxpayers, if not more. Depreciation is by far the most troublesome. But inventories have also been the cause of innumerable arguments between the government and the manufacturer. There is not room in this article to discuss inventories at length. However, it is well to say in passing that the Board of Tax Appeals has been entirely fair in its rulings on inventories, and, in one very recent case overruled the income tax administration and saved a concern several thousand dollars in additional taxes. The concern in this case had taken inventory on the basis of the market value of its goods, which value was a great deal below cost. The income tax authorities turned down the taxpayer's method of computing inventory on the ground that the reduction below cost was arbitrary. But the Board sustained the concern and overruled the Internal Revenue Bureau when the taxpayer proved that his figures were based on actual sales made about the time the inventory was taken.

Perhaps the greatest development since the inception of the tax laws, so far as the public is concerned, is the decision by the United States Supreme Court, and later by the United States Board of Tax Appeals also, that where there is a doubt regarding the assessment of a tax, the doubt should always be decided in favor of the taxpayer and against the government. In your contact with the tax authorities, this is a valuable thing to remember.

Modern Methods Applied to Three Plants One of Which Excels in Design

By F. A. Westbrook

THE New York Trap Rock Corporation is of long standing and high reputation in the crushed stone industry. It operates three plants along the Hudson River in the state of New York. Two of these plants are on the east bank and one is on the west. The combined production of these three plants totals more than 10,000 tons per day. The three plants known as the Verplank, Cedar Cliff and Clinton Point will be discussed in this article. All three are thoroughly modern and efficient. The Verplank plant is, however, the outstanding of the three. It is a model for permanency and efficiency. It is one of the most modern crushed stone plants in the country.

The Verplank Plant

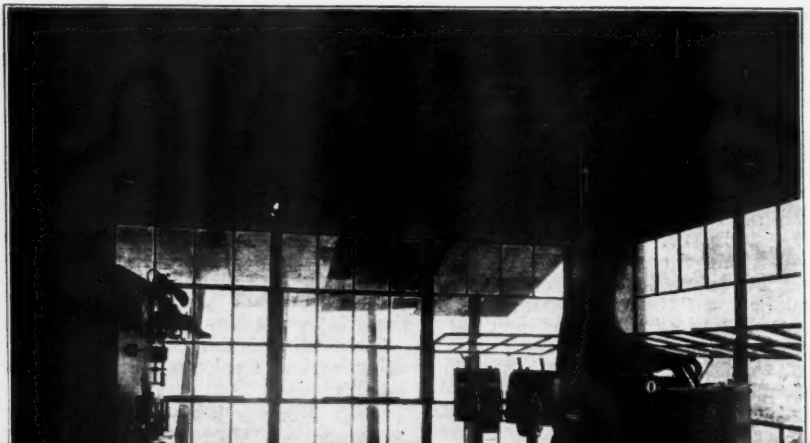
This plant is located about forty miles north of New York City on the east bank of the Hudson River. This is a new plant, having replaced the old plant, which was destroyed by fire on March 19, 1924. The new plant was placed in operation in April, 1925, but since then additional units have been installed and minor changes made so that increased demands could be met this spring with the increased capacity. The present capacity is 5,000 tons per day. The plant is all of steel and concrete. The Burrell Engineering and Construction Company designed and erected the plant and also installed the machinery. The complete plant is an excellent example of sound engineering and construction.

The quarry covers an area of about seven acres. The quarry floor is 26 feet below the river level and the quarry face runs from 75 to 90 feet. The ultimate depth of the quarry will probably be 180 feet. The rock is an excellent grade of dolomite limestone and it is practically free from seams. The drilling is done by means of three Sanderson Cyclone electric well drills.

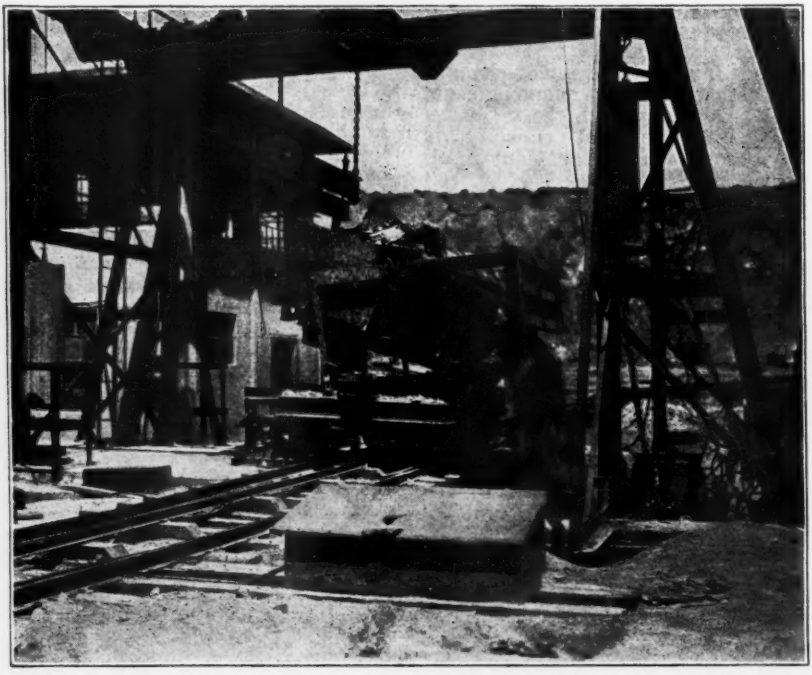
The stone is loaded by three Bucyrus and one Marion shovel. The Bucyrus shovels are 120-B electric, 30-B and 50-B. The Marion is a model 37. The 120-B shovel is equipped with a four yard dipper, 29½ foot boom and 30 foot dipper sticks. It is mounted on single truck caterpillars.

Rock is handled from these shovels to the primary crusher by the Woodford Haulage System, consisting of seven ten-yard cars. All cars are equipped with standard railway motors and operate as single units rather than in trains. These cars are of the side dumping type and were built from the designs of the Woodford Engineering Company by the Western Wheeled Scraper Company. All car movements, including switching and dumping, are under the control of one operator in the main control tower centrally located in the quarry, the dumping being accomplished by means of a motor operated car dumping apparatus which forms a part of the Woodford Haulage System. As is customary with this system of haulage, the spotting of the cars for load-

A General View of the Modern Verplank Plant of The New York Trap Rock Corporation



Interior View of the Concrete Control Tower—Operator Controls Movement of all Cars



The Woodford Control Tower; Car Being Discharged at Primary Crusher

ing at the shovel dipper and the starting of the car toward the crusher immediately upon their being loaded is accomplished by means of a shovel controller operated by one of the shovel crew. Thus one man actually handles all of the material from the shovels to the crusher.

Crushing and Scalping

The primary crusher into which the cars are dumped is a 48x60-inch Traylor Bulldog jaw crusher. At this point there is also a pneumatic cylinder hoist, which is used to dislodge large pieces of rock which become wedged so that they do not fall into the crusher. Of course, by having such a large primary crusher it is not only possible to handle a large quantity of stone, but it reduces the amount of breaking up of large pieces after blasting which would otherwise be necessary.

From this point onward, it should be noted, there is the most unusual system of belt conveyors. The conveying equipment in its entirety, including idler pulleys, gearing and the majority of the belts were furnished by the Robins Conveying Belt Company, as were also all the screens and grizzlies except as noted. Some of these belts, also, are unusually large.

The accompanying diagrammatic sketch of the flow of material through the crushing and sizing operations will help to clarify the following descriptions.

The stone from the Traylor jaw crusher is conveyed on a 42-inch U. S. Rubber Company belt, 305 feet between centres, to two Robins "Cataract" grizzlies, where it is scalped. The figures given for distances between centers of conveyors are in each case approximate within a few feet, but accurate enough to give a good idea of their size.

The overs from these grizzlies drop into a No. 10 Kennedy gyratory crusher—the throughs from the grizzlies and the stone from this crusher are then conveyed on another 42-inch U. S. Rubber Company belt, 225 feet between centres, to four Allis-Chalmers revolving screens.

These screens are each provided with four 4-foot sections having 2⅛ inch perforations and one 4 foot section having 3 inch perforations. The screening surface is perforated manganese steel plate. The material which passes through the 2⅛ inch perforations is finished, although not separated, and is conveyed on a 36 inch U. S. Rubber Company belt, 220 feet between centers, to the screen house for sizing. The material which passes through the 3-inch holes in the revolving screens drop into a bin and

Looking Across the Quarry Floor at the Verplank Quarry

runs through a chute to a 72 inch Traylor roll crusher.

Third Crushing

The tailings from the revolving screens are dropped into four No. 6 Allis-Chalmers gyratory crushers; and the stone from these crushers and from the roll crusher are conveyed by means of a 36-inch U. S. Rubber Company belt, 117 feet between centers, back to the 42-inch conveyor belt leading from the Robins grizzlies to the revolving screens. In this way the stone from the last, or tertiary, gyratory crushers and the roll crusher, which has been sufficiently reduced in size passes on to the screen house and that which is still too large again goes through the crushers.

The reason for having the Traylor roll crusher is to increase the amount of the smaller sizes, more especially the ¾-inch, for which there is a larger proportional demand, at the expense of the 1½-inch size, for which the demand is generally less.

The revolving screens also have a 6-foot jacket, with a ¼-inch mesh cloth. This takes out the dirt and other small material which is conveyed to the waste storage pile by a 24-inch U. S. Rubber Company belt, 265 feet between centres.

Screen House—Sizing

The stone from the smaller openings of the revolving screens is conveyed to the screen house by the 36-inch belt already mentioned and is first passed over four "Cataract" grizzlies with 1½-inch openings.

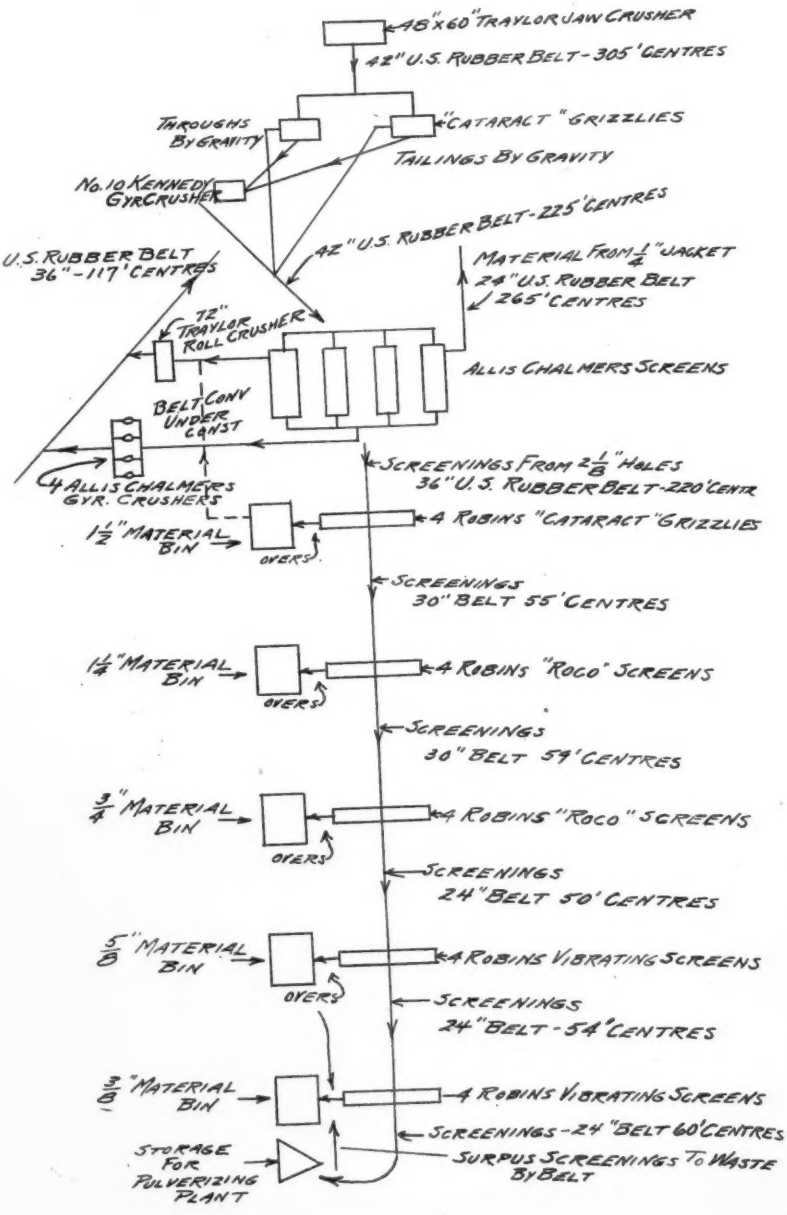
The overs are dropped into a large cylindrical concrete storage bin, 50 feet in diameter, for 1½-inch material. The throughs are deposited on a 30-inch belt, 55 feet between centers and conveyed to four "Roco" shaking screens, provided with 1-inch mesh cloth. The overs are dropped into a similar storage bin for 1¼-inch material.

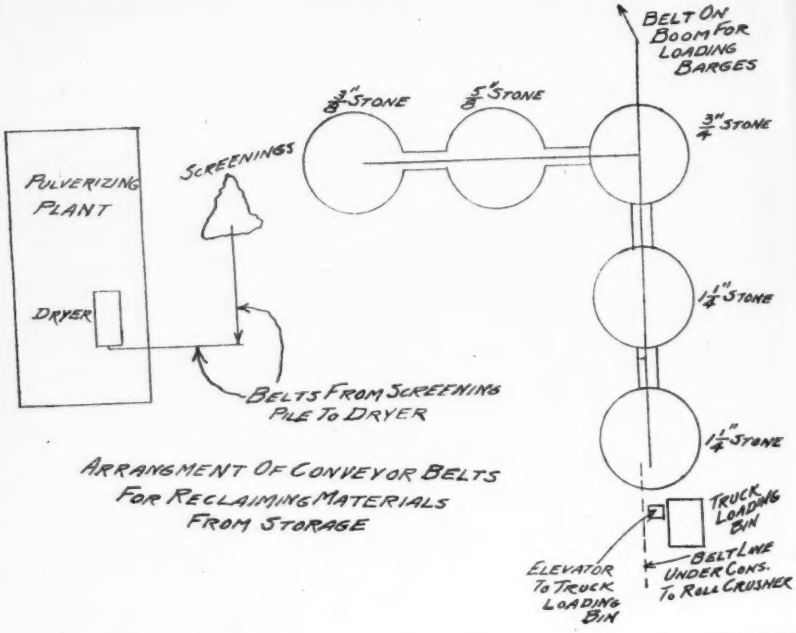
The throughs are conveyed by a 30-inch belt 59 feet between centers, to four more "Roco" screens, with ⅝-inch mesh cloth. The overs are dropped in the ¾-inch material bin.

The throughs from this second "Roco" screen are carried by a 24-inch belt, 50 feet between centres, to four High Speed vibrating screens having ½-inch mesh cloth and the overs are dropped into the ⅝-inch bin. The throughs are deposited on another 24-inch belt, 54 feet between centers, and conveyed to the last screen operation. This consists of four more High Speed vibrating screens equipped with ¼-inch mesh to furnish overs of ⅜-inch size, which are dropped into the proper bin. All of the conveyor belts associated with these screens and the screens themselves

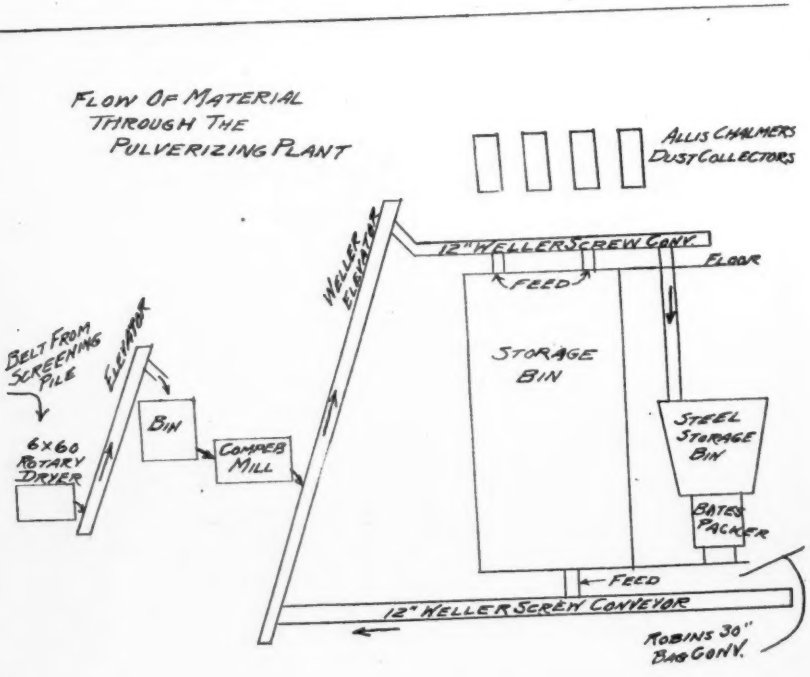
The 120 B Shovel Loading at The Verplank Quarry

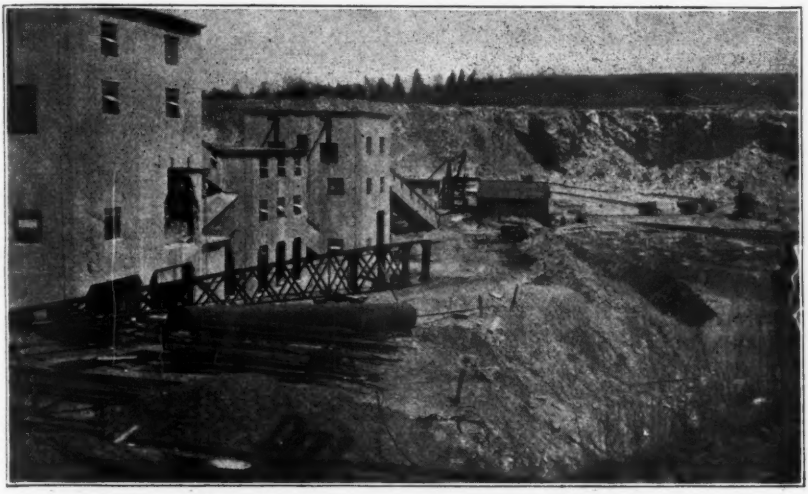
FLOW SHEET of CRUSHING PLANT at VERPLANK, N.Y.





ARRANGMENT OF CONVEYOR BELTS FOR RECLAIMING MATERIALS FROM STORAGE





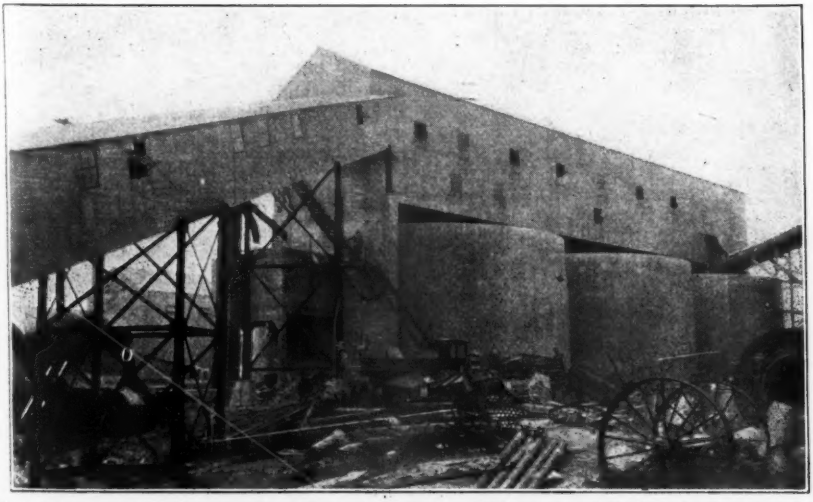
The Quarry and the Incline for the Conveyor to the Grizzlies Is Shown Here

were furnished by the Robins Conveying Belt Company.

The throughs from this last screen are disposed of in either one of two ways. They may be taken to the storage pile for the pulverizing plant on a 24-inch Robins belt, 60 feet between centers; or they may be taken to the waste pile north of the screen house by two 20-inch Buffalo Weaving and Belting Company belts, in series, 165 and 129 feet between centers respectively.

Provision for More Small Material

Before proceeding further it will be interesting to take note of an addition which is being made to the crushing equipment, the possible desirability of which was foreseen, but the necessity of which was not proven until after the new plant had been put in operation. The situation is that at certain seasons of the year there is a considerable demand for larger sizes of crushed stone, particularly the 1½ inch. At other times, especially while concrete road construction is under way, the demand for the large size falls off and that for the ¾-inch size greatly increases. Consequently it was found that a greater amount of flexibility in controlling the output of



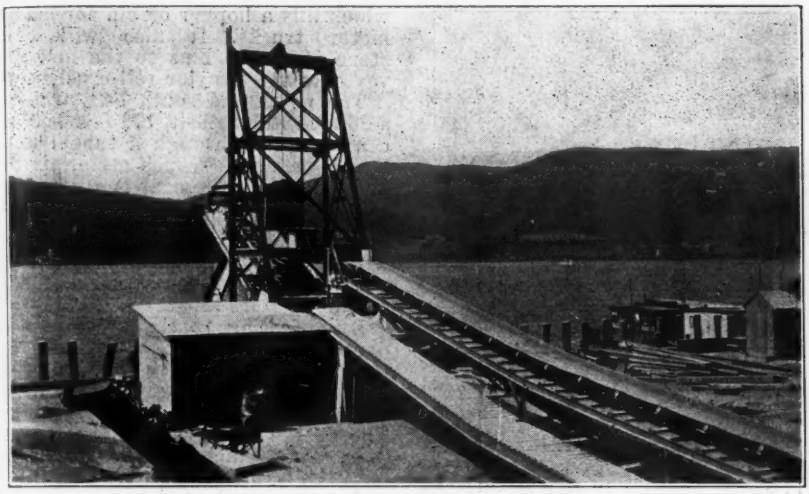
The Conveyor Incline to the Screen House. Note the Cylindrical Storage Bins

The Discharge from the Kennedy Crusher to the Robins Conveyor

the various sizes of stone was desirable than was possible with the arrangement so far described.

To provide for this flexibility a tunnel is now being constructed for a belt conveyor from the bottom of the bin for the 1½-inch stone back to the Traylor roll crusher. This crusher has a capacity for much more material than it now receives from the 3-inch perforations in the revolving screens and within its limits, which are wide, it can be made to provide as much of the smaller sizes as is desired by recrushing the 1½-inch material. Obviously, it was a matter of good engineering and good judgment originally to install a roll crusher of sufficient capacity and to so construct the bottom of the 1½-inch storage

The 42 Inch Conveyor from the No. 10 Crusher to the Allis Chalmers Revolving Screens



The Loading Boom and Belt Conveyor from Tunnels for Loading Barges

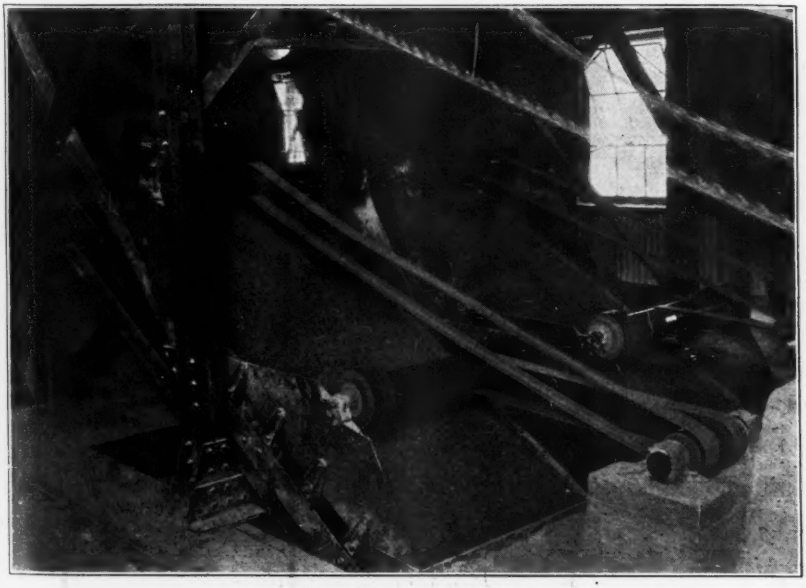
bin so that this readjustment could be made with a minimum of expense and loss of time.

Loading Finished Material

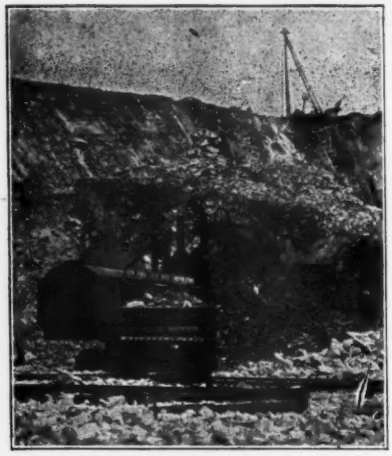
There are five bins for finished crushed stone. These are on two sides of a right angle, one lying in a north and south direction and the other east and west, as shown in an accompanying diagram. There are tunnels under these bins with openings from the latter to belt conveyors.

The east and west conveyor, which is a 36-inch Robins belt, 258 feet between centers, extends from the 1½-inch bin, passes under the 1¼-inch and ¾-inch bins to the edge of the dock. At this point there is another belt on a boom, into which it spills, for the even and convenient loading of barges.

The east and west belt under the bins is reversible. That is, it may carry stone to the dock or back to the Jeffrey elevator near the 1½-inch bin,



The Vibrating Screens



View of the Quarry Face Showing the Drill Shovel and Quarry Car at Verplank Quarry

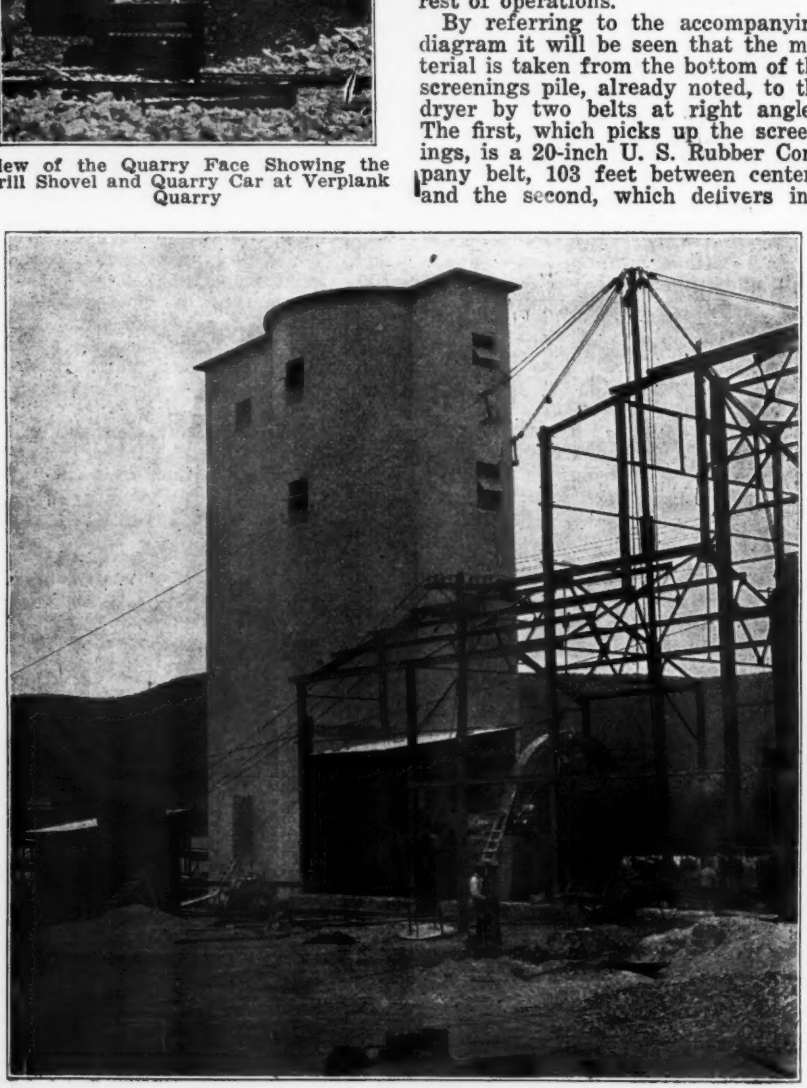
which fills a hopper or bin for loading motor trucks. It also will carry stone from the bins to the new conveyor to the Traylor roll crusher.

The north and south belt, which is a 36-inch Robins belt, 173 feet between centers, runs through a tunnel under the ⅜-inch and ⅝-inch materials bins and spills into the east and west belt.

Pulverizing Plant

The pulverizing plant is equipped with labor-saving machinery in the same comprehensive manner as for the rest of operations.

By referring to the accompanying diagram it will be seen that the material is taken from the bottom of the screenings pile, already noted, to the dryer by two belts at right angles. The first, which picks up the screenings, is a 20-inch U. S. Rubber Company belt, 103 feet between centers, and the second, which delivers into



The Pulverizing Plant at Verplank

the dryer, is also a 20-inch U. S. Rubber Company belt, 112 feet between centers.

The dryer is a 6x60 foot Worthington rotary. The material from this is taken to a bin by a Jeffrey elevator and from this bin it refeeds by gravity into an Allis-Chalmers compeb mill.

The pulverized material is then taken by a Weller elevator to the top of the building, where Allis-Chalmers dust collectors are located, and thence by a Weller screw conveyor to the large storage bin or to a smaller storage bin over the Bates packer. At the bottom of this building is another Weller screw conveyor, which carries the droppings from the packer back to the elevator; or if the packer is being supplied with material from the large storage bin, the outlet at the bottom of the latter is opened, the outflowing material is taken by the screw conveyor to the elevator and then by the upper screw conveyor to the bin over the packer.

The bags from the Bates packer drop onto a bag conveyor, which is a 30-inch N. Y. Rubber Company belt, 120 feet between centers, and are carried out over boats moored at the dock, and dropped into them.

Conclusion

The accompanying photographs and diagrams of the flow of material will help to clarify the foregoing descriptions. Perhaps the most interesting fact shown by the pictures is the substantial and permanent character of the structural work, which is concrete or steel, with galvanized metal sheathing.

Of course, electric drive is used exclusively. All of the motors under 50 h. p. are operated at 440 volts and above 50 h. p. at 2200 volts. Most of them are Allis-Chalmers induction motors, although some other makers are represented. The conveyors and "Cataract" grizzlies are driven through Palmer Bee speed reducers.

Probably in going through this plant, aside from the Woodford Haulage System in the quarry, the thing which will most particularly attract the visitor's attention and make the most lasting impression is the efficiency of the belt conveying systems. There are no elevators except two in the pulverizing plant and one to the truck loading bin, and there is undoubtedly a smoothness and continuity of operation as a result of this which could be obtained in no other way.

As there are so many conveyor belts the company has adopted a form for a belt record which should prove to be very valuable as time goes on. It shows the performance of each belt, its stretch, cost, life and other details which will make it possible to determine the best size, make and construction for each application of this expensive item of equipment. A reproduction of this form is shown in one of the illustrations.

The Cedar Cliff Plant

This plant is just north of Newburgh, New York. The stone is a dolomite and occurs in a thick sheet.

General View of the Quarry at Cedar Cliff Showing Train of Dump Cars Discharging to Primary Crusher

Form 6-1M-12-24

NEW YORK TRAP ROCK CORPORATION
BELT RECORD

DRIVE No. 1

QUARRY Verplank

LENGTH 611 Ft

WIDTH 42 INCHES

LOCATION ~~OF DRIVE~~ Carries Stone From Jaw Crusher To Grizzlies In No. 10 Crusher Bldg.

PLY 7

MAKER	PRICE	ORDER No.	INSTALLED	REMOVED	STRETCH INCHES	REMARKS
U.S. RUBBER			1925 April 1		6/30/25 -43	Installed By Burrell Engineering & Construction Co.
					7/29/25 -36	
					11/11/25 -24	

The quarrying operation embraces whole hills. The quarry floor is above the river level and the face varies in height from 75 to 130 feet. Eventually, as the quarry is worked back, this face will reach 210 feet. Drilling is by five Sanderson Cyclone electric well drills. Holes are drilled to the full depth of the face and blasting is with Atlas 60 per cent cordite. The stone is loaded into dump cars by three 50-B Bucyrus full revolving steam shovels.

The face of the quarry is paralleled more or less closely by tracks for the trains of dump cars. These are of five-yard capacity, of the side dump type and made by the Western Wheeled Scraper Company. There are five to a train. These trains are pulled by Whitcomb gas engine locomotives, of which there are six in operation. The quarry is in two sections and the tracks from each section converge at the large primary crusher.

This crusher, which is a 48x60-inch Bulldog jaw crusher made by the Traylor Engineering Company and driven by a 175 h. p. General Electric induction motor, is located below the surface, so that the dump cars may be dumped directly into it. The arrangements at this point show much ingenuity and are worthy of special notice.

In the first place, two men with long iron rods stand on each side of the opening to push the pieces of rock into the crusher if they become wedged, as frequently happens. It also frequently happens that a large piece of rock becomes jammed which these men cannot move. For such conditions a pneumatic cylinder hoist has been provided which, with

The 50B Shovel at Work Loading at Cedar Cliff

the help of a pair of hooks, is used to dislodge such pieces.

A tunnel has been constructed from the discharge point of this crusher for a belt conveyor which ascends at a gradual angle above the ground level, passes over a High Duty magnetic apron pulley manufactured by the Magnetic Manufacturing Company and discharges into the secondary crushers. This belt is unusually wide and was made especially for this particular job. It is 42 inches wide, seven ply and has a 5/16-inch covering on both sides. It was installed about a year ago, was run all of last season on one side and was turned over this year. The side used last year shows very little wear and it is expected that it will give several years' service. It was made by the Cincinnati Rubber Company and the rollers on which it runs were made by the Robins Conveying Belt Company.

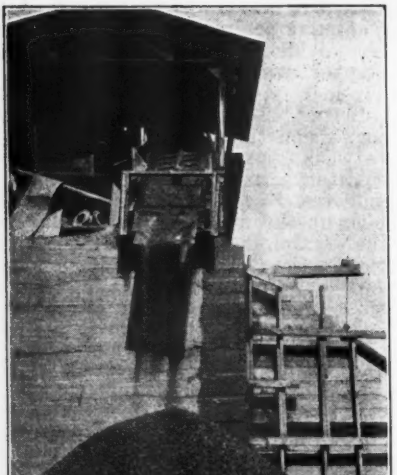
The purpose of the magnetic pulley is, of course, to remove pieces of iron from the crushed stone coming from the primary crusher which would be likely to damage the secondary crushers. These are most likely to be pieces broken off the dipper of a steam shovel which are of very hard steel and likely to do considerable damage.

The stone from the primary crusher as discharged by the belt conveyor is divided between two secondary crushers—one of which is a No. 8 and the other a No. 9 Allis-Chalmers gyratory crusher.

Let us first follow the material through from the No. 9 crusher. It is raised in a bucket elevator and discharged into two 12x48-inch Allis-Chalmers scalping screens; that is, it is divided between them. These screens will pass everything up to 1½-inch pieces, which are dropped into two 42-inch elevators. The tailings from this screen are divided up between four No. 6 Allis-Chalmers gyratory crushers and the product is delivered to the same elevators which pick up the material passing through the scalping screen. This elevator carries the stone to two screens, which sort out the 1½-inch and 1¼-inch sizes and deposits them on separate belt conveyors which carry them to their respective storage bins. The ¾ and ⅝-inch sizes pass through this screen, are deposited on a belt conveyor which delivers them to an elevator and thence to a screen which separates them into ¾ and ⅝-inch sizes. The separate sizes are then deposited on belt conveyors and carried to their proper storage bins. Before dropping into the storage bins, however, each grade is washed. This is a very simple process. The stone as it leaves the belt passes over a flat screen or plate perforated with holes too small to let through the proper size, but large enough for the several small streams of water playing over it to carry off dirt or small grit and ⅜-inch sizes.

These washings pass off through a trough to another, rather distant, screen where the ⅜-inch material is reclaimed and the dirty water run into a sump or well, whence it is pumped into a swamp some distance away.

Train of Dump Cars Being Discharged at Cedar Cliff Into Primary Jaw Crusher



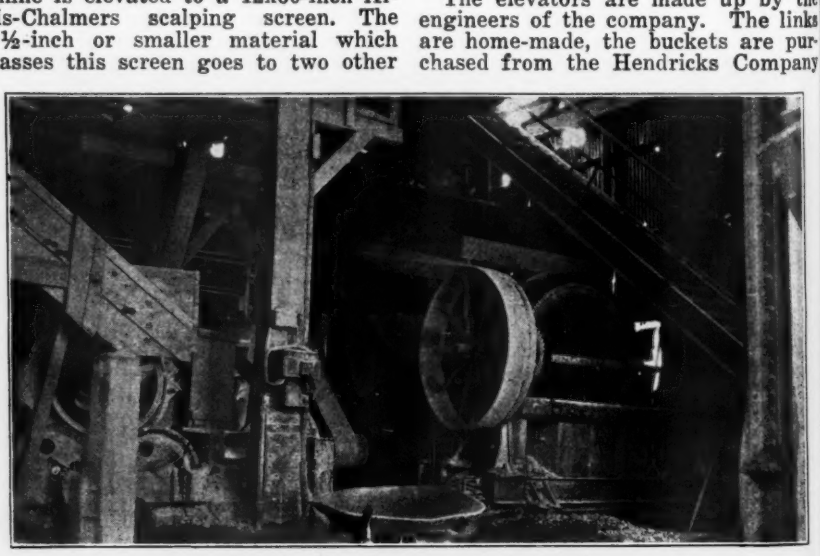
The Storage Bin at End of Bridge. Note Material Being Washed By Small Streams of Water

Now to come back to the No. 8 Allis-Chalmers secondary gyratory crusher. The material from this machine is elevated to a 12x60-inch Allis-Chalmers scalping screen. The 1½-inch or smaller material which passes this screen goes to two other 30-inch elevators and the tailings are divided among four No. 8 Traylor gyratory crushers. This material is elevated by the same two elevators to a grading screen where the 1½-inch and 1¼-inch sizes are removed and so on to the same four conveyor belts which carry the four sizes to the washers and storage bins, as previously described.

Material is removed from the storage bins by means of a belt conveyor passing through a tunnel under them. These bins are of concrete and are arranged in a line at right angles to the bridge housing other belt conveyors as they cross above the West Shore Railroad tracks to the dock where the river barges are located. The bank above the river is high and steep so that the bottom of the storage bins is approximately on a level with this bridge. The conveyor under the bins discharges into a belt running at right angles to it in the bridge. This latter belt terminates over a chute arranged for loading either trucks or freight cars, if desired, or to discharge into another belt conveyor which carries the material out over a barge moored at the dock.

Comparatively little is transported by rail or truck. The bulk of it is loaded on barges holding from 600 to 650 yards apiece. Four or five of these are ordinarily loaded each day. The company charters a number of barges, but has a large number of its own.

The elevators are made up by the engineers of the company. The links are home-made, the buckets are purchased from the Hendricks Company

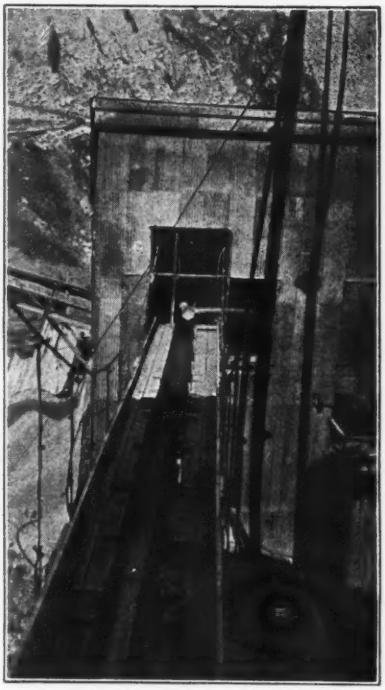


The Grading Screens at Cedar Cliff

and the chains were formerly Durex and lately Jeffries. The belts for conveyors have been obtained principally from the Cincinnati Rubber Company and the U. S. Rubber Company, but other manufacturers are represented, such as Buffalo Belting and Weaving Company, Manhattan, Dick and so forth.

The plant is completely electrified, except for the shovels and locomotives. The motors are as follows:

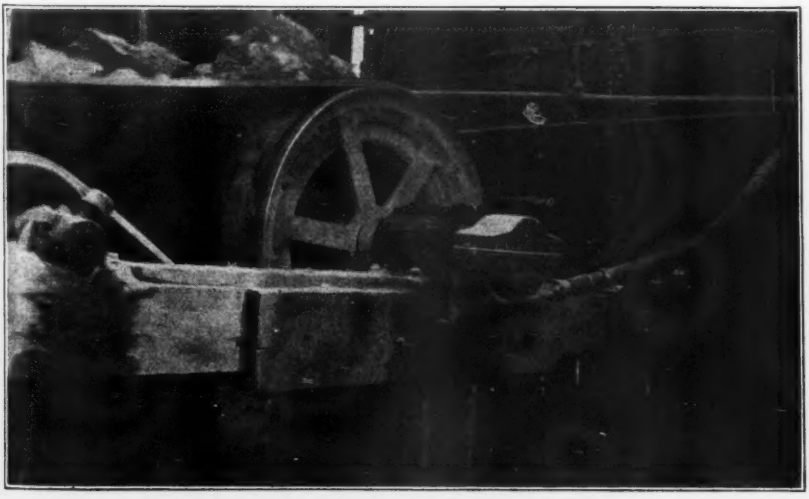
48x60-inch Traylor Bulldog Crusher .....175 h. p.
No. 9 and four No. 5 Allis-Chalmers gyratory crushers.300 h. p.
Elevator from No. 9 crusher and scalping screens which it feeds.....100 h. p.
Two elevators to grading screens and belt conveyors to ¾ and ⅝-inch screen and to storage bins.....150 h. p.
No. 8 Allis-Chalmers gyratory crusher ..... 75 h. p.
Elevator from No. 8 crusher to scalping screen and scalping screen ..... 75 h. p.
8-inch Traylor gyratory crushers (4), each..... 40 h. p.
Two elevators to grading screen and screen..... 75 h. p.
Two belt conveyors from bottoms of storage bins to loading points, each..... 25 h. p.
Screen for reclaiming ⅜-inch material ..... 25 h. p.
Air Compressor .....200 h. p.
Pump for water for air compressor and steam shovels.. 50 h. p.
For pumping off waste (2) .....20 and 25 h. p.



Trough for Washing to Reclamation Screen for Obtaining ⅜ Inch Material

Pump for washing plant and fresh water (2).....150 h. p.
Pump for water for reclaiming ⅜-inch material..... 25 h. p.

All of these motors are induction motors and all are General Electric except the last, which is an Allis-



Magnetic Pulley for Removing Tramp Iron, etc.

Chalmers. All of the pumps are Morris and the air compressor, used principally for the jack hammers and air hoist, is an Ingersoll-Rand.

The Clinton Point Plant

There are two quarry faces at this plant above river level. The height varies from 65 to 85 feet. The lower face is 55 feet in height. Electric and gasoline well drills are used in the drilling. The stone is loaded by steam shovels of both the railroad and full revolving type. Two of these shovels are 50-B Bucyrus make, one is a 110-C Bucyrus railroad shovel, another is a 103-C Bucyrus railroad and the fifth is a class 45 Atlantic railroad type shovel. The quarry cars are hauled to the crushing plant by eight 25-ton steam saddle tank locomotives over a standard gauge track with eight 5-yard cars to each train.

The primary crusher is a No. 21 Allis-Chalmers. The stone is elevated from the primary crusher by a 42-inch steel link bucket elevator and discharged into two No. 8 Allis-Chalmers crushers. These two crushers can be operated as separate units, as they each feed a No. 6 crushing and screening plant. Each of these secondary crushing plants is equipped with seven No. 6 Allis-Chalmers crushers and four 30-inch steel chain link bucket elevators and seven screens of different sizes.

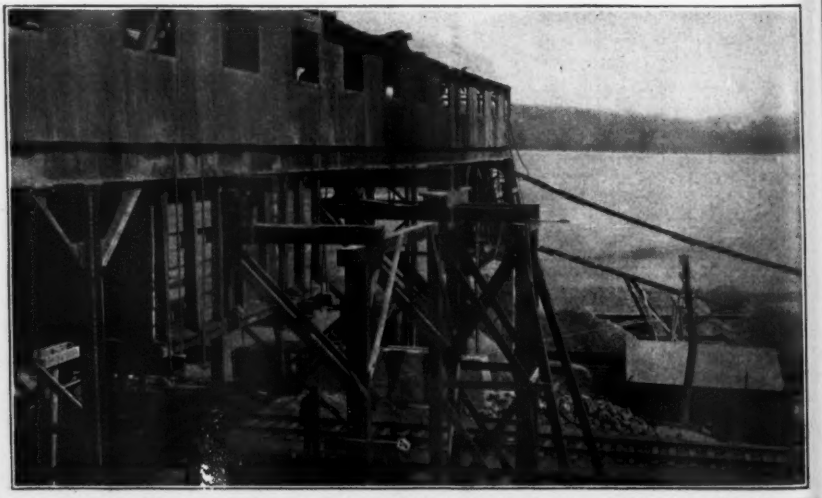
The stone is carried to storage bins of wood construction and about 800 cubic yards capacity each. The stone is reclaimed from under the bins with two belt conveyors, which discharge onto a loading boom conveyor for loading barges in a similar manner to the arrangement in the Verplank plant. All of the buildings are of timber construction covered with corrugated iron sheeting.

The New York Trap Rock Corporation maintains their main office at 110 Park Avenue, New York City. N. D. Lancaster is president, W. P. Foss is vice president, R. W. Jones is treasurer, M. D. Wandell is in charge of purchases and sales, R. T. Gent is general superintendent. Thomas Kelleher is superintendent of the Verplank plant. P. J. Gilchrist is superintendent of the Cedar Cliff plant. Thomas Lynch is superintendent of the Clinton Point plant.

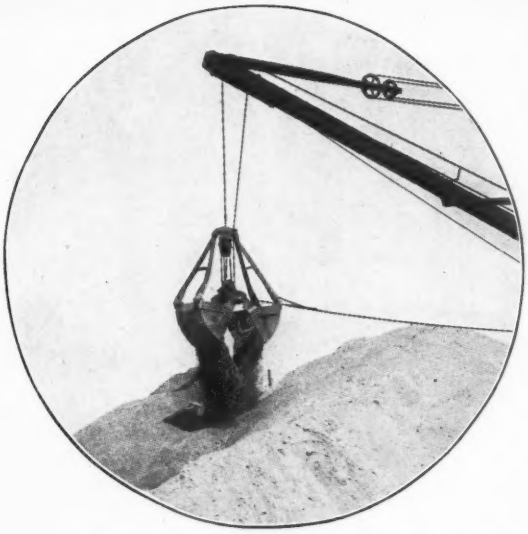
Foote Brothers Name Sanders

T. R. Sanders, 180 Milk Street, Boston, Massachusetts, has been appointed as district representative for Foote Bros. Gear and Machine Company, of Chicago. Mr. Sanders will cover Rhode Island and the eastern half of Massachusetts and operates under the direction of the New York office in charge of J. R. Shays, Jr.

The Uehling Instrument Company announces the appointment of W. B. McBurney, 619 Trust Co., of Georgia Bldg., Atlanta, as representative for Apex CO_2 recorders and indicators, fuel waste meters, and combined barometer and vacuum recorders, in the Georgia and Eastern Tennessee territory.



Bridge Across the Railroad at Cedar Cliff for Discharging Material Directly Into Barges



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"Hercules" RED STRAND Wire Rope Has Proved Its Ability

When you put on a "HERCULES" Wire Rope you are not experimenting with an untried product, for it is backed by a long service record, and a record of long service. It has been used for handling sand, gravel and rock under all kinds of conditions and on all kinds of equipment.

Tell us how you use wire rope and we shall be glad to suggest the right construction for best results.

Made of acid open-hearth steel wire

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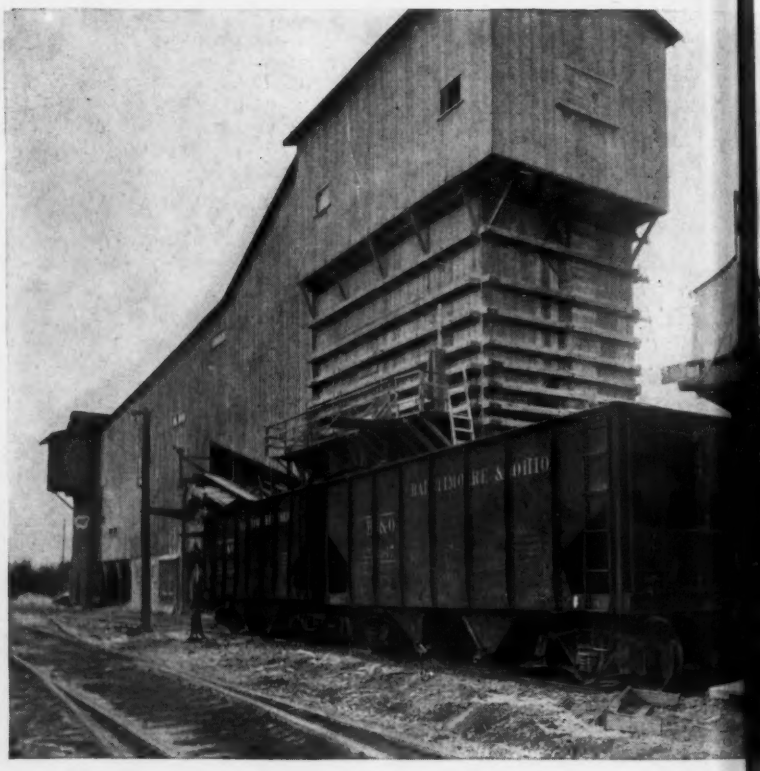
Plymouth Cuts Haulage t f



Users of Plymouth Gasoline Locomotives have been so willingly and exultant in expressing their appreciation of its utility and economy that we are not only pro l, bu to keep the h tche formance.

THE FATE-ROOT-HEATH CO., *(Ply omo*

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Gasoline

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ALPENA GRAVEL CO.
Millersburg, Mich

Oct. 9, 1925.

The Fate-Root-Heath Co.,
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Gentlemen:

The two Plymouth locomotives in use at our gravel and ballast plant have proven very satisfactory. The 8-ton machine shown in the photo handles approximately four hundred tons with seemingly very little effort.

Both locomotives have given very excellent service at a moderate maintenance cost and have saved considerable time and unnecessary expense in our operation.

Yours very truly,
(Signed) B. E. Green,
General Manager,

Plymouths are made in 3 to 20-ton sizes and in any track gauge.

Write for Catalog and Performance Bulletins "C" and "F"

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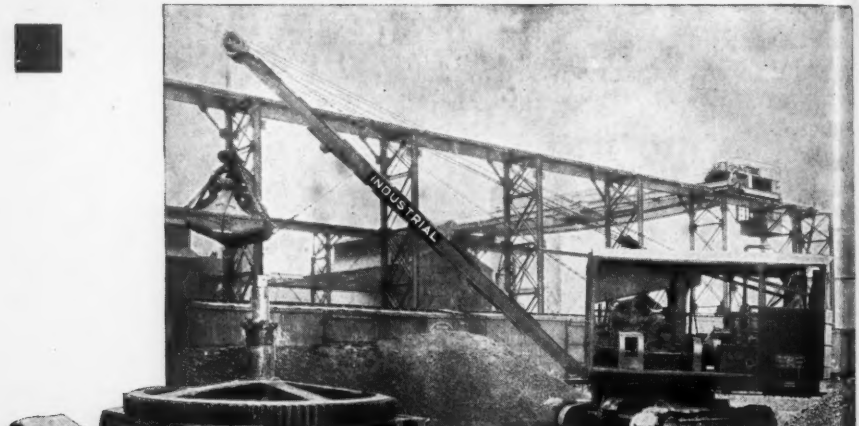


"GEE—HAW!"

YOU remember the old days when a loud "GEE" from a teamster lead his team in one direction and a "HAW" in the opposite. Well, now-a-days it's even easier than that to steer an INDUSTRIAL crawler.

A patented steering device controlled entirely from the operator's platform through friction clutches makes possible any kind of curve. The operator merely touches a lever and the rest is easy. Full power to both treads is the essential secret of the INDUSTRIAL steering device. However, either belt may be stopped entirely for real sharp turns when required, but for the average turn, full power to both treads gives a smooth, steady curve. Versatility—nothing else but.

The crawler base shown here is one of the several reasons why INDUSTRIALS excel. By means of the patented steering device this base will carry the machine anywhere at the command of the operator. The propelling gears are high up out of the dirt and you will notice that no chains are used, a remarkable advantage in itself. The treads have cast steel shoes of a design that gives a smooth bearing surface to the ground. This and many other features make this car the envy of other crawler machine manufacturers. Follow our advertisements from issue to issue and you will see more clearly why INDUSTRIALS excel.

Write for Book 120-A

INDUSTRIAL WORKS, BAY CITY, MICH.

INDUSTRIAL

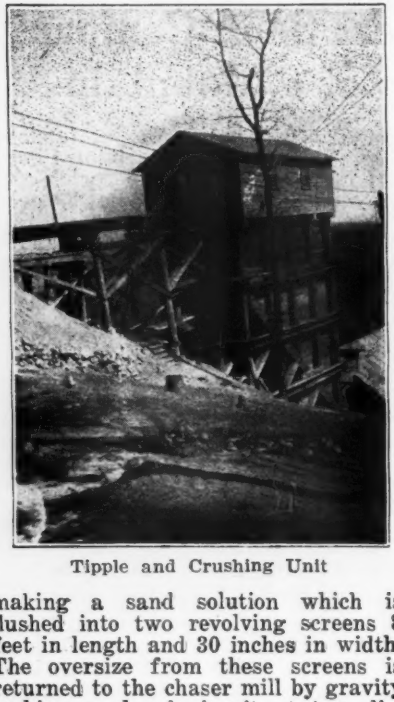
How the Maryland Glass Sand Company Produces From Top of a Mountain

LOCATED on a plateau, which is the top of a conical mountain known as Round Top Mountain, about 1,500 feet above sea level and 900 feet above the Potomac River, is a silica deposit, operated by the Maryland Glass Sand Company. The plant and deposit more specifically located is at Round Mountain, Maryland, four miles west of Hancock on the main line of the Western Maryland Railroad overlooking the Potomac River, the Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad. The deposit is of a soft and even grain and very low in iron and is estimated to contain ten million tons. The silica content runs from 99.2 to 99.9 per cent, while the iron runs from 0.01 to 0.025 per cent. This is considered an excellent deposit for the glass sand industry. The sand is underlaid with a very good grade of limestone.

The deposit is soft enough so that very little blasting is required. There are quite a number of boulders scattered throughout the deposit which must be broken with dynamite. A ¾ yard model 21 Marion electric shovel loads the sand into 5-yard heavy steel Koppel gable bottom dump cars which are hauled to the plant. These cars are hauled a distance of about 2,000 feet by gasoline locomotives. One of these is a 5-ton Plymouth with a friction drive, while the other is a 4½-ton Whitcomb, gear driven. The track is 80 pound rail and the locomotives cover the distance at a rate of from 20 to 25 miles per hour.

The cars are discharged to a storage bin of 300 tons capacity. This bin has a 45 degree angle bottom chute which feeds to a 12x16 inch Phillips-McLaren Blake type crusher. At the top of the bin steel rails have been placed at intervals of 12 inches which keep out any rock too large for the crusher to handle. One man is stationed here to break up the oversize. At the mouth of the crusher a one inch stream of water is kept constantly running on the sand in the bin which results in the sand sliding very freely to the crusher and making the crusher work under a choke feed. More water is applied in the crusher jaws to prevent the crushed material from sticking in the chute which delivers the discharge from the Blake crusher to the 9-foot Phillips-McLaren double discharge chaser mill. The crusher and the chaser mill both have a capacity of 50 tons per hour. In the chaser mill additional water is added

General View of the Quarry



Tipple and Crushing Unit

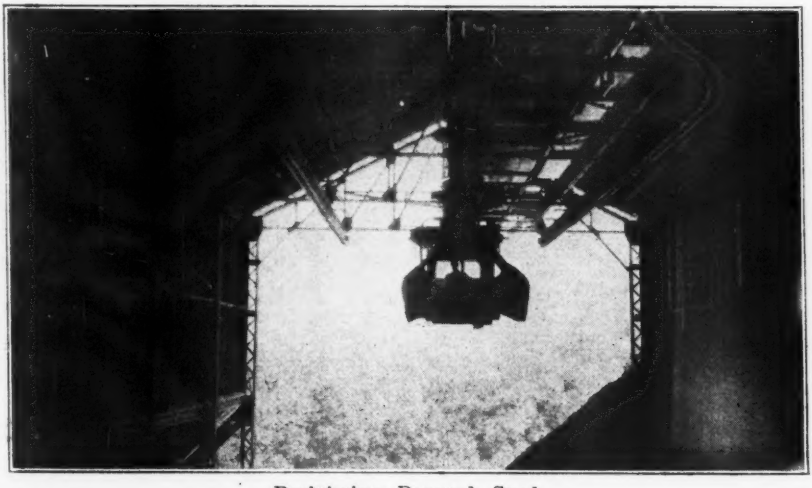
Shovel and Locomotive

making a sand solution which is flushed into two revolving screens 8 feet in length and 30 inches in width. The oversize from these screens is returned to the chaser mill by gravity making a closed circuit at two discharge points. A 50 h.p. General Electric slip ring motor drives the crusher, chaser mill and screens. The water necessary is supplied by two 8x12 Aldrich triplex pumps each having a capacity of 300 gallons per minute. These pumps are located along the Potomac River from which they pump the water. These pumps are 2,500 feet from the three water tanks which are alongside of the hill on top of the mountain. The pumping head is 800 feet and necessitates working against 360 pounds pressure. These pumps have 8 inch suction and 6 inch discharge, and the water is pumped through a 6 inch pipe line to the tanks. Each is equipped with a 100 h.p. motor. The three water tanks on top of the mountain have a combined capacity of 65,000 gallons.

Washing, Loading and Drying Plant

The washing and drying facilities are located alongside the railroad at the foot of the mountain. The material passing the screens at the crushing plant is conveyed to this washing plant through an 8 inch hard glazed terra cotta pipe line. This pipe is laid on a very steep grade, and the average life of the terra cotta is one year. The sand and water stream is divided at the washing and drying plant six ways by means of a wooden flume line with divider boards and directed to six banks of Lewistown screw flight conveyor washers. The overflow is run into settling bins where the water is allowed to rise three feet in which all the sand of value settles. The loam and finer material spilling over is carried by pipe to the Potomac River. The sand accumulated in the settling bin is used exclusively for building and foundry purposes. The sand separated by the washing screws passes from one screw to the other. Fresh water is applied between each screw. The screws are on thirty degree angles. The third screw deposits the sand on a Goodyear conveyor belt which in turn discharges into leaching and storage bins of 10,000 tons capacity. The arrangement of the set of six banks of washing screws is such that only those needed for actual production are in use. When the crusher is grinding mostly rock, two banks can often handle all the material. When soft material is being handled the entire six banks are in use. Both water and power are saved as a result of this flexibility. The storage building is a steel structure and was built to serve for damp sand storage as well as leaching. In a very severe winter it is not profitable, even if practical, to operate the quarry. This storage unit has proven to be adequate during these severe weather conditions. The conveyor belt delivering to storage runs on the top of the storage building, and the sand is scraped off at five different points.

After the sand has been leached for at least 24 hours or until it contains less than 5 per cent moisture, it is reclaimed for drying by means of a Shephard electric monorail crane hoist equipped with a one yard Hayward clamshell bucket. This crane reclaims from the oldest pile in storage first and discharges to a dryer hopper of 70 tons capacity. The dryer is a Lewistown steam pipe type. This dryer was originally 35 feet long with one set of intake manifolds and one set of outlet manifolds with a capacity of 12 tons per hour. This has been changed to two 17½ foot sections. The steam condensation is very much less with the short section of pipe. There results more heat and the capacity is increased several tons an hour. A stack exhaust 65 feet long and 24 inches in diameter is used to draw the moisture from the dryer. This is an improvement of the fan exhaust quite frequently used. A 100 h.p. Erie return tube boiler furnishes the steam for the dryers. This boiler is operated at 100 pounds steam pressure. The water from condensation drains to one point where an auto-

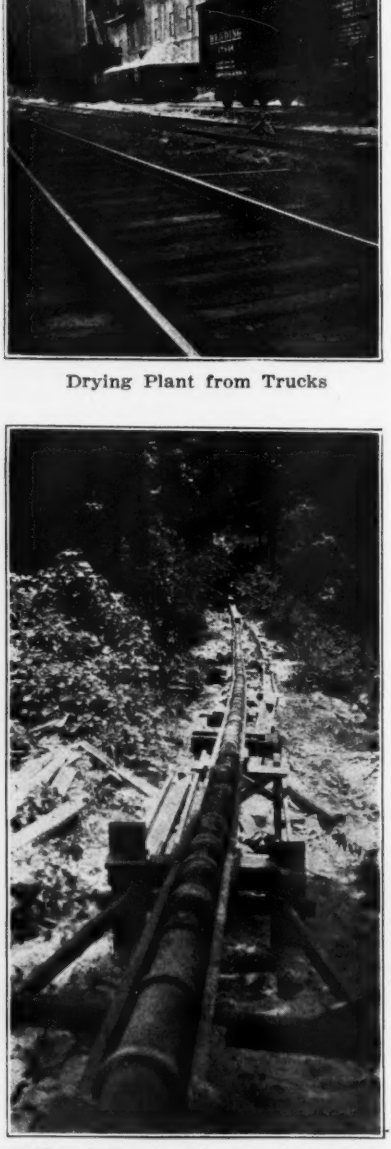


Reclaiming Dumped Sand

Mill and Flume

Drying Plant from Trucks

Suspension Bridge Carrying Flume



Method of Transporting Sand to Railroad

matic Worthington boiler feed pump returns it to the Erie boiler. Only 500 gallons of fresh water are required in 24 hours.

The sand with its moisture content is supported by the top row of steam pipes, and as the steam is applied to these pipes the sand begins to dry and work its way down through the system of steam pipes until it finally reaches a hopper which in turn feeds a Goodyear belt conveyor. The bottom rows of pipes are spaced one-quarter of an inch apart and only sand which is thoroughly dry passes. The dry sand is elevated by the belt conveyor a height of 75 feet where it is screened through a 26 wire mesh trommel screen. The sand passing this screen falls into a tower storage bin of 100 tons capacity. From this storage the sand is loaded by gravity into paper lined box-cars.

The capacity of the crushing and washing units is 10,000 tons per month while the drying capacity is 8,000 tons per month. The plant was started in 1918. The first year was devoted largely to developing the quarry. At first all the product was sold to the building foundry and traction trade. For the last five years sales have been largely confined to the glass trade. Electric power is bought from the Potomac Edison Power Company.

The main offices of the Maryland Glass Sand Company are located at Hagerstown, Maryland. The executives include R. J. Funkhouser, president; E. N. Funkhouser, secretary-treasurer; H. H. Jennings, general manager; C. O. Hartrock, purchasing agent, and M. L. Funkhouser, superintendent.

A. R. B. A. Meeting in New York

The annual meeting of the American Road Builders' Association will be held Friday, May 14th at the Engineer's Club, New York, according to an announcement made by W. H. Connell, president of the association. "The meeting held annually in May is a very significant event," said President Connell, "and is growing in size and importance each year. Preparations are being made to entertain the largest number of delegates in the history of the association. Plans will be discussed at that time for holding the 24th annual Convention and Road Show in 1927."

Among the activities of the assembly will be the reports of Charles M. Upham, business director of the association, President Connell and Treasurer James H. MacDonald. The general meeting will convene with a banquet at the Engineer's Club on the evening of May 14th, preceded by a meeting of the board of directors in the afternoon. Two directors will be elected to fill vacancies caused by the death of Lewis S. Louer, Chicago, and W. H. Stone, Baltimore. New officers to be installed include H. G. Shirley, Richmond, Va. as president.

Flume Crossing Railroad Tracks

Three Cement Plants Merged

Announcement has been made, through E. H. Rollins and Sons, of the formation of the Consolidated Cement Corporation, with an authorized capital of $35,000,000, to operate a chain of portland cement manufacturing plants.

The corporation has acquired the business and assets of three well known central and mid-western plants. The three plants to consolidate are the Peninsular Portland Cement Company of Cement City, Michigan, one of the Cowham System plants, the Great Western Portland Cement Company of Mildred, Kansas and the Fredonia Portland Cement Company of Fredonia, Kansas.

The combined properties have been appraised at approximately $7,500,000. The combined total output of the three plants operating individually in 1925 was approximately 2,750,000 barrels. With the addition of new kilns and other equipment now being installed, the combined total capacity of the three plants will be in excess of 3,000,000 barrels per year.

The Peninsular Portland Cement Company was one of the first portland cement producing plants in the middle west, and had a long and successful record of operation. The company was organized in 1899 by W. F. Cowham, later the builder and operator of a chain of plants, and founder of the Cowham System. The Peninsular plant is credited with being the first to apply individual electric drive to cement making, an innovation that revolutionized cement manufacturing.

Both the Fredonia and the Great Western plants are old established and well known in the mid-west territory. The Fredonia plant has been an important producer of cement for eighteen years. This plant is one of the few in the United States using natural gas for burning the raw materials in the kilns.

The Consolidated Cement Corporation will be operated by the Cowham Engineering Company of Chicago. This company specializes exclusively in the engineering and management of cement plants. John L. Senior, president of the Cowham Engineering Company, will act in a similar capacity for the Consolidated Cement Corporation. He is also president of the Signal Mountain Portland Cement Company at Chattanooga, Tennessee, and the Florida Portland Cement Company of Tampa, Florida, and a director of the Trinity Portland Cement Company of Texas and the Peerless Portland Cement Company of Michigan.

The capitalization of the Consolidated Cement Corporation upon the completion of present financing, will include a $4,000,000 first mortgage sinking fund gold bond issue, a $1,100,000 convertible gold note issue, $1,465,400 of 7 per cent cumulative preferred stock and 100,000 shares of no par value common stock.

Blaine Smith Elected Officer Universal Cement Company

Blaine S. Smith, who started as a salesman with the Universal Portland Cement Company in 1908 from which he was advanced through various positions to that of general sales manager in 1915 and in which position he is credited with developing one of the most successful selling organizations in the country, was elected vice president of the company at a meeting of its board of directors, April 6th. He also is president of the Portland Cement Association.

For many years Mr. Smith has been identified with the Chicago Association of Commerce as vice president, member and chariman of various committees, and member of the board of directors. He is also a director of the Illinois Chamber of Commerce. He is a member of the American Society for Testing Materials, American Concrete Institute, Western Society of Engineers and the U. S. Chamber of Commerce.

Uncle Sam Brewer Dies

"Uncle Sam" Brewer, a Confederate veteran and pioneer employee of the Dixie Portland Cement Company at Richard City, Tennessee, died recently at the age of 83 after a short illness. He was on the company's pension list and was affectionately known around the executive offices of the company at Chattanooga as the "assistant to the president." Mr. Brewer was identified with the Dixie Company from its earliest construction days up to the time of his death.

Compressed Air and Air Compressors

By C. H. Sonntag

PART V

Speed Control

STEAM-DRIVEN compressors may be run at varying speeds, and their output may be controlled in this way, but the speed and air pressure must both be limited to safe maxima. The common control for the smaller sizes of machines with a fixed cut-off is by means of a modification of the well-known throttling governor. When the speed reaches the desired point the fly-balls rise and throttle the steam supply through the governor valve in the usual way. On one side is a small upright cylinder under a horizontal arm carrying an adjustable weight. The cylinder is connected to the air receiver, and when the desired pressure is reached the piston pushes up the horizontal arm, which lowers the spindle of the governor valve and throttles the steam supply. The air pressure at which this occurs is determined by the setting of the adjustable weight.

On compressors having Corliss steam cylinders speed control is by varying the cut-off or time of admission as is customary in engines of that class. The governor has a pressure controller somewhat like that just described, but instead of throttling the steam it shortens the cut-off when the pressure reaches the desired maximum and slows the machine down without reference to the speed governor.

Unloading Devices

Compressors driven by belt, direct-connected motor or oil engine are essentially constant speed machines, and their air capacity and pressure must be controlled by other means than by slowing them down. Several means of accomplishing this have been worked out by the various manufacturers.

One of the simplest and most widely used on small machines consists of a special valve in the inlet pipe, controlled by the receiver pressure. When this pressure has risen to that for which the regulator is set the valve closes and shuts off the air supply to the compressor, which consequently can deliver none, and runs under friction load only. In some designs the unloading valve is either wide open or tight shut, so that the compressor is either fully loaded or running entirely free. In other types the valve closes progressively through a small range of air pressure, say five pounds, so that the load is thrown on and off gradually and the machine may run on partial load much of the time.

Large two-stage compressors that have an unloading valve in the suction line are usually provided also with some device that will open the discharge of the high pressure cylinder to the atmosphere a few seconds after the suction unloader closes. This prevents high temperatures being built up through churning of the small amount of air that leaks in around the piston rods.

This type of unloader causes the compressor to work either at full load or none, though in duplex angle compounds and duplex tandem compounds, which consist of two separate machines with a common shaft, the unloaders may be set so that one will act before the other, and operation at 50 per cent load and capacity is possible.

Another device for controlling the output functions by holding some or all of the inlet valves off their seats, so that a proportionate volume of the air drawn in during the suction stroke is blown out again without compression. This unloader was used successfully on the old style poppet valve machines, and has now been adapted to those having plate valves. Each set of inlet valves is under the control of a differential unloader, which consists of a valve held to its seat by an adjustable spring in opposition to the air pressure. When the latter reaches the value for which the tension of the spring is set the valve opens and air passes through it and to operating plungers behind the inlet valves, holding them open and unloading the compressor.

The two unloaders are generally mounted on the intercooler. If they are set for pressures a few pounds apart, unloading will be in two steps, since at first the suction valves in one end only of the cylinders

will be opened. If the pressure continues to rise the second unloader will open the rest of the suction valves and the machine will be completely unloaded. In two-stage compressors corresponding groups of valves on the high and low pressure cylinders are opened simultaneously, so that the correct cylinder ratio is maintained.

Still another system of unloading makes use of clearance pockets cast in the walls of the cylinder, which may at times be opened to the interior of the cylinder, greatly increasing the clearance volume. The connection is made under control of a special regulator.

There are two clearance pockets at each end of the cylider, so proportioned that each reduces the compressing capacity 25 per cent. The four valves, one of each pocket, open and close the ports between the pockets and cylinder. They are not the regular suction and discharge valves of the machine.

The valves are held closed by air pressure on their rear ends. When the predetermined pressure is reached the master controller releases the air from behind one of the valves, which is opened by the pressure in the cylinder. The piston can not now draw in fresh air until that compressed in the clearance pocket has expanded to the inlet pressure, so that the suction valves do not open until the piston has traveled some distance in its stroke. If the pressure continues to rise other valves open successively until all are open and no air is being compressed. It is evident that the control is in five steps, 100, 75, 50, and 25 per cent and no load, and the machine may run continuously at any one of these ratings. The range through which this progressive action takes place is from five to seven pounds, so that regulation is close enough for all practical purposes. In two-stage machines equivalent clearance is added to both cylinders at the same time, so that correct cylinder ratio and intercooler pressure are maintained.

It is possible to combine in one machine clearance control and that by lifting the suction valves, and obtain either 3 step or 5 step control, and this has been done by one large manufacturer. There is one clearance pocket which can be opened to the crank end of the cylinder. Doing this is the first step in unloading, and reduces the capacity 25 per cent. Further unloading is brought about by holding open some or all of the suction valves in one or both ends of the cylinder. In two-cylinders two-stage machines proper cylinder ratio and intercooler pressure are maintained at all stages of unloading.

Lubrication

Far more trouble is caused in compressor cylinders and valves by too much rather than too little oil. Conditions are not the same as in a steam cylinder, since the oil is not subject to the washing action of hot water. After the cylinder bore has received its polish, one, or in large machines, two drops per minute will be ample. More will cause carbon deposits on valves, ports and air pasages, causing valve leakage and necessitating cleaning. Such deposits may also be possible causes of explosions in discharge pipes and receivers.

The oil should be a light, pure mineral product, but since in the present state of our knowledge specifications for oils are not altogether conclusive, it is wise to consult with a reputable oil company and buy on the basis of quality rather than price.

Dependence on gravity to force oil through a needle valve set to pass one drop per minute is rather uncertain, and more reliable service will be had from one of the mechanical force feed lubricators or oil pumps. They may be equipped with several independent pumps, so that oil may be sent to all the parts needing it and in the proper amounts.

Cooling

All air compressors except the very smallest have water-jacketed cylinders so that the walls may be kept cool enough for lubrication. Two-stage machines need water for the intercooler, and if an after-cooler is used it will also require water. It is essential that the water be reasonably soft, else the jackets will eventually fill up with scale and require cleaning.

Where water is scarce and must be conserved it may be cooled and used repeatedly. For small machines this may be done in automobile-type radiators. For large compressors especially those permanently located, resort may be had to the spray ponds and cooling towers familiar in steam power plant practice.

It is frequently of interest to know

the amount of cooling water that will be needed for a given compressor. Longacre has given us the following expressions for this:

$G = 75 + 2\frac{1}{2}t$ when intercooler and jackets are in series.

$G = 20 + 2t$ for the intercooler only.

$G = 2t$ for high and low pressure jackets only.

Where G is in gallons per hour per 100 cubic feet of free air per minute and t is the entering temperature of the water in degrees Fahrenheit.

An after-cooler does not lessen the power needed for compression nor the size of the machine. Its principal functions are first, to condense much of the moisture in the air and so prevent its collection in the low places in the pipe lines and the freezing up of drill exhausts, and second, by reducing the temperature and hence the volume of the air, to lessen the friction loss in the pipes. The following table by the Ingersoll-Rand Company gives the amount of water required by after-coolers, the compressor working to 80-100 pounds pressure.

Temp. of water, deg. F.	50	60	70	80	90
GPM per 1,000 cu. ft. free air per minute ...	120	140	160	180	200

Receivers

These are of no great value for a reserve supply of air when the compressor is shut down, but they do serve to smooth out the pulsations in the air as it comes from the compressor, to cool it somewhat, and to trap out most of the oil and some of the water in it. The flow in the line beyond the receiver will be practically steady. When the line is long it is well to put another receiver at the far end to equalize the irregular demand and allow steadier flow through the main line.

Air Filters

Few of us realize the amount of solid matter that is constantly carried about as dust in the air. Farm tractor builders have found out about it by sad experience, since the dust raised by these machines when plowing is often quite heavy, and when drawn into the engine with the injection air has caused serious cutting in the cylinders. Most tractors are now fitted with some form of air washer to catch this dust, and recently some of the late passenger cars have similar devices.

Every air compressor ought to draw its supply through some sort of purifier. For small machines this may be a skeleton box frame with the sides made of cotton flannel, but for large compressors such an arrangement would be bulky and unsightly. A very ingenious and compact device for this purpose (*) consists of a frame carrying one or more units, each in the form of a box about 18 inches square and four inches thick. The square sides are made of rather fine mesh expanded metal or woven wire screen with about ⅜ inch openings. The four inch space between the square sides is filled with a loose mass of short copper tubes or ferrules roughly ⅜ inch in diameter and ½ inch long that have been dipped in a viscous oil. Enough of these units are arranged in a frame so that their resistance to the passage of the air will be nominal, and all the suction of the compressor passes through them. In their tortuous journey through the mass of ferrules the dust particles are caught and held by the oil.

The amount of dust that this simple device will collect is surprising. It is suitable also for purifying the suction air for internal combustion engines. The ferrules must be frequently removed and washed with gasoline or kerosene and coated with fresh oil.

Size of Compressor to Buy

In deciding upon the capacity of the compressor that will be needed to keep a certain number of drills in operation four facts are essential:—the altitude, the number of drills, the air consumption of each while running, and the fraction of the whole number that will be really in operation at one time. No drill will work continuously, since it will lose time while changing steel and while moving and setting up in a new location, and it has been found that a fair number of drills can be kept in full practical use by a compressor too small to run them all continuously. It is hardly safe to apply this principle to a smaller number of drills than five, but above that it is perfectly safe. However, a certain allowance must be made for pipe line friction, for leakage and for other possible uses for air besides drilling. The altitude will not be of material influence below 3,000 feet.

The two tables following, published by the Ingersoll-Rand Company, embody the information called for

*Midwest Filter Co., Chicago, Ill.

above. The first table, covering the air used by a drill, refers particularly to reciprocating machines. For those of the hand-hammer type it is better to secure the air consumption from the maker, since there are so many sizes and kinds.

Table VIII

The total air needed may now be found by multiplying that used by one drill by the factor taken from table IX, which takes into account the number of drills, the number likely to be in actual operation at one time, and the altitude.

Table IX

For instance, let us say we have in the quarry a total of twenty drills with 3¼ inch cylinders to be run on 90 pounds pressure, and that the quarry is at 4,000 feet altitude. Table VIII shows that each drill will use 141 cubic feet per minute. Table IX shows that under these conditions the factor 13.34 is to be used. If we multiply 141 by 13.34 we get 1,880 cubic feet per minute as the least possible displacement of a compressor to do this work. If allowance for leakage and other uses is made it will appear well to buy a machine with a displacement of not less than 2,300 cu. ft. per minute.

New Link Belt Florida Office

Link-Belt Company, of Chicago, Indianapolis and Philadelphia, has recently announced that Nelson Brandt has rejoined their sales management force, and that he will manage a new branch office which is to be opened up in Florida.

This should be of interest to the many friends and former customers of Mr. Brandt, who is well known throughout the South, but particularly along the Atlantic Seaboard, as an expert in engineering equipment.

He will not only solicit sales for both engineering and merchandise material throughout the State of Florida, with office location at, or in the vicinity of, either Jacksonville or Orlando, but he will also establish and maintain contact relations with the Link-Belt Company's agents, Cameron and Barkley. It is also reported that he will work hand in hand with L. J. De Honey, the Chicago sales representative at Miami.

Foote Bros. Election

At a recent meeting of the directors of the Foote Bros. Gear and Machine Company, of Chicago, W. C. Davis was re-elected to the office of president and, also, elected treasurer of the company.

TABLE VIII—CUBIC FEET OF FREE AIR

Required to Run One Reciprocating Piston Drill of Size and at the Pressure Stated Below

Gauge Pressure Lbs.	Cylinder Diameter of Drill												
	2"	2¼"	2½"	2¾"	3"	3¼"	3½"	3¼"	3½"	3⅝"	4¼"	5"	5½"
60	50	60	68	82	90	95	97	109	108	113	130	150	164
70	56	68	77	93	102	108	110	113	124	129	147	170	181
80	63	76	86	104	114	120	123	127	131	143	164	190	207
90	70	84	95	115	126	133	136	141	152	159	182	210	230
100	77	92	104	126	138	146	149	154	166	174	199	240	252

TABLE IX—MULTIPLIERS

To Determine Capacity of Compressor Required to Operate from 1 to 70 Rock Drills at Altitudes Compared with Sea Level

Altitude Above Sea Level Feet	Number of Drills Multipliers																	
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	30	40	50	60	70
0	1.	1.8	2.7	3.4	4.1	4.8	5.4	6.0	6.5	7.1	8.1	9.5	11.7	13.7	15.8	21.4	25.5	29.4	33.2
1000	1.03	1.85	2.78	3.5	4.22	4.94	5.56	6.18	6.69	7.3	8.34	9.78	12.05	14.1	16.3	22.0	26.26	30.3	34.2
2000	1.07	1.92	2.89	3.64	4.39	5.14	5.78	6.42	6.95	7.60	8.67	10.17	12.52	14.66	16.9	22.9	27.28	31.46	35.52
3000	1.10	1.98	2.97	3.74	4.51	5.28	5.94	6.6	7.15	7.81	8.91	10.45	12.87	15.07	17.38	23.54	28.06	32.34	36.52
4000	1.14	2.05	3.08	3.88	4.67	5.47	6.15	6.84	7.41	8.09	9.23	10.83	13.34	15.62	18.01	24.4	29.07	33.52	37.8
5000	1.17	2.10	3.16	3.98	4.8	5.62	6.32	7.02	7.61	8.31	9.48	11.12	13.69	16.03	18.49	25.04	29.84	34.4	38.84
6000	1.20	2.16	3.24	4.08	4.9	5.76	6.48	7.2	7.8	8.52	9.72	11.4	14.04	16.44	18.96	25.68	30.6	35.4	39.84
7000	1.23	2.21	3.32	4.18	5.04	5.9	6.64	7.38	7.99	8.73	9.96	11.68	14.39	16.85	19.43	26.32	31.36	36.16	40.84
8000	1.26	2.27	3.40	4.28	5.17	6.05	6.8	7.56	8.19	8.95	10.21	11.97	14.74	17.26	19.9	29.96	32.13	37.04	41.83
9000	1.29	2.32	3.48	4.39	5.29	6.19	6.96	7.74	8.38	9.16	10.45	12.26	15.09	17.67	20.38	27.6	32.9	37.92	42.82
10000	1.32	2.38	3.56	4.49	5.41	6.34	7.13	7.92	8.58	9.37	10.69	12.54	15.44	18.08	20.86	28.25	33.66	38.8	43.82
12000	1.37	2.47	3.70	4.66	5.62	6.57	7.4	8.22	8.9	0.73	11.1	13.02	16.03	18.77	21.64	29.32	34.94	40.28	45.48
15000	1.43	2.57	3.86	4.86	5.86	6.86	7.72	8.58	9.3	10.15	11.58	13.58	16.73	19.59	22.59	30.6	36.46	42.04	47.47

Careful Planning and Sound Judgment Make Small Operation Profitable

By F. A. Westbrook

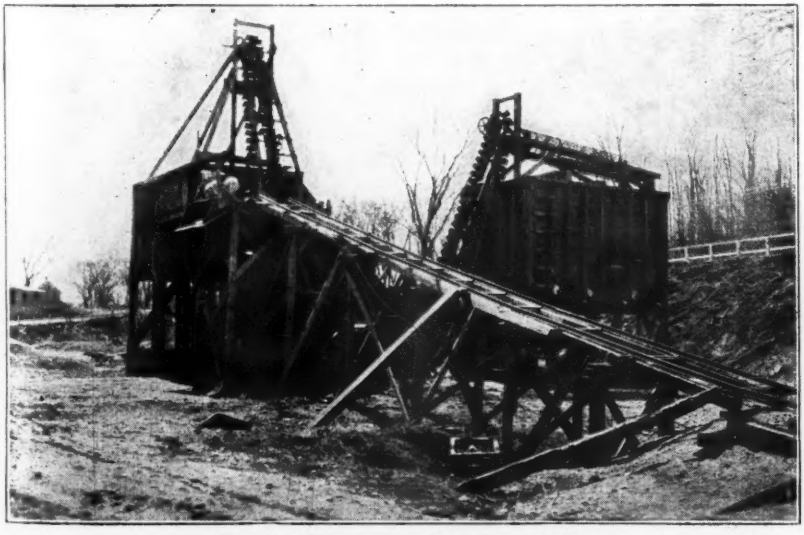
W. B. FERRIS has operated a gravel bank in Fairfield, Conn., for many years. He started in using horses and carts and now he has a rather unusually well arranged and efficient plant. In fact, with the help of two men and a boy, he can get out as much as 150 yards of material in a day.

Just how Mr. Ferris has managed to build up such good production is interesting. His methods are open to everybody if they will only embrace their opportunities. What he does is to visit as many other similar operations as possible and make use of what he sees when he thinks the application will be helpful to him. There seems to be hardly an operation in his part of the country which he has not visited and studied, with the result that he has seen all kinds of machinery at work, knows how and under which conditions each can be used to the best advantage, cost, upkeep, and so forth.

Grizzly Crushers and Elevators

Reading also seems to be an important part of Mr. Ferris' method. He says that he makes it a point, for instance, to look over each issue of Pit and Quarry, not only the editorial pages, but also the advertising, and that between the two he has obtained many of his ideas and made many of his purchases.

The equipment is simple and efficient although not very extensive. Excavating is done by means of an



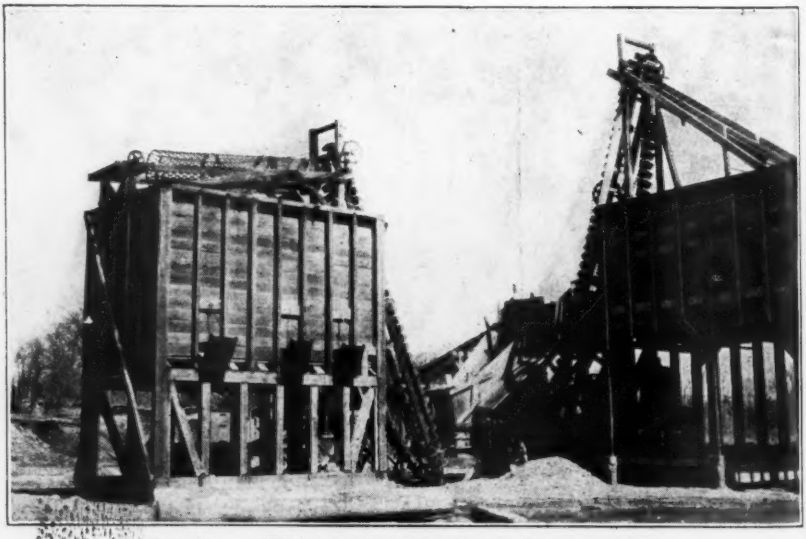
View of Plant Showing Car Incline

Bank Showing Car and Shovel

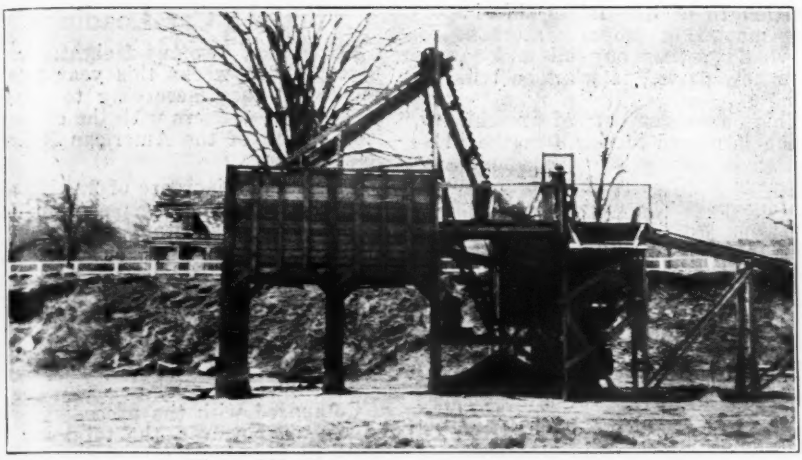
Erie ½ yard steam shovel. This is operated by one man. The material picked up by the shovel is deposited in a Koppel, one yard, side dump car which runs on rails made by the Sweet Steel Company.

The car is then pulled up an incline by means of a patent hoist operated by means of an 8 h.p. two cylinder LeRoy gasoline motor. The material is dumped into a grizzly by the man who operates the hoist and the car is then allowed to run down its incline by gravity back to the shovel. A boy is employed to look after the car, keep the tracks clear, and the cable free.

The material which passes through the grizzly is picked up by a bucket elevator made by Universal Road Machinery Company and run by means of another 8 h.p. LeRoy gasoline motor and Blue Streak rubber belt. The material is raised to an elevation of 29 feet where it is dropped on to a flat screen. The latter is at an angle of about 30 degrees and consists of a large mesh extending across both bins (50 yard capacity) and a second flat screen of smaller mesh which cov-



Bins Are at Right Angles; Crusher Is Between Them



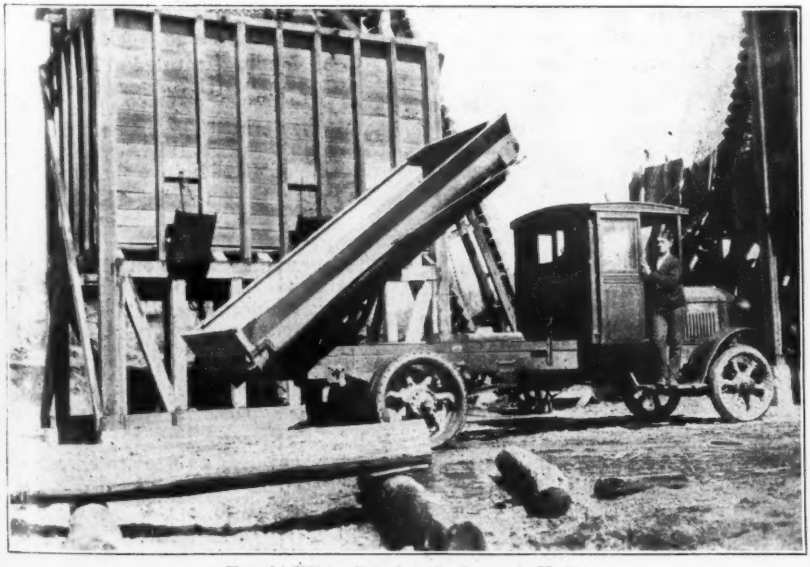
Dumping Platform Showing Hoist

ers only the first bin. Two grades of material are thus secured.

The material which does not pass through the grizzly slips into a Reliance jaw crusher. This is driven by a Fordson tractor with a canvas belt, obtained from the K. B. Noble Company of Hartford, Conn., from whom Mr. Ferris buys most of his supplies.

An elevator, Universal Road Machinery Company, is run by another Goodyear Blue Streak belt from a pulley on the crusher and carries the crushed stone up to a rotary screen at the top of another set of three bins as shown in the illustrations. This screen is also run indirectly from the Fordson tractor and is made by the Universal Road Machinery Company. It supplies three sizes of crushed stone.

Mr. Ferris himself looks after the crusher, elevators, screens and other details. He says that he pays particular attention to the lubrication of his machinery because he buys only the best and is well aware that it can only do itself justice from the standpoint of production, maintenance,



Truck With Special Body and Hoist

and length of life unless this important matter is properly attended to. "I would rather buy oil and grease than new parts," is what he tells his men.

This arrangement of machinery, which is shown in detail in the illustration is planned for a production of 20 yards per hour, but this, of course, is only possible when everything is operating without trouble in every detail. It is a maximum which it is not generally possible to realize throughout a whole working day.

That Mr. Ferris has chosen widely and maintained carefully is demonstrated by the fact that all of this machinery except the steam shovel has been in service for almost seven years.

In addition to the machinery for production, there are also one Haiss loader, driven by a LeRoy engine, and three trucks. Of these latter two are four ton Rickers which are now quite old and the third is a five ton General Motor with Wood body and Wood hoist.

The operation described is not on a large scale, but it is on a very profitable basis as a result of careful planning and sound judgment. It is the kind of operation which any open-minded operator could probably study with benefit to himself.

Johnson Car Replacer

The Johnson Car Replacer is an exceedingly simple device consisting of a pair of broad frogs which fit snugly over the rail and allow the car to be pushed or pulled over them and guide the car to its proper place. They straddle the rail and need no spikes or clamps to fasten them in place, resting on the rails in both front and back. They are so made that they adjust themselves to the different heights of rails and form a friction grip with the rail while they are being used.

Another advantage of the Johnson replacers is that they bring the rails to gauge during car repacement. They do not put the load on one or two ties, but distribute the load over the whole rail. They are made of open hearth cast steel and are properly annealed. Johnson replacers are made in six sizes.

The Rockton Molding Sand Company has organized a Chicago sales branch known as the Manley Sand Company, 527 West Roosevelt Road. L. T. Manley will have charge of this office.

Freight Car Loadings

Loading of revenue freight for the first thirteen weeks this year totaled 11,985,598 cars, according to reports filed by the carriers with the car service division of the American Railway Association.

This was an increase of 203,189 cars over the corresponding period in 1924. It also was a substantial increase of the corresponding periods in 1920, 1921, 1922 and 1923.

For the week ended on March 27, loading of revenue freight totaled 967,838 cars. This was an increase of 35,069 cars over the same week two years ago.

Compared with the preceding week this year, however, the total for the week of March 27 was a decrease of 9,371 cars, reductions being reported in the loading of all commodities with the exception of miscellaneous freight as well as merchandise and less than carload lot freight, both of which showed increases.

Miscellaneous freight loading for the week of March 27 totaled 360,697 cars, an increase of 7,651 cars over the week before and 1,747 cars above the same week in 1925. It also was an increase of 32,043 cars above the same week in 1924.

Loading of grain and grain products amounted to 32,312 cars, a decrease of 2,208 cars under the week before but 3,297 cars above the same week in 1925. It also was an increase of 2,489 cars above the same week in 1924.

Coal loading totaled 171,413 cars, a decrease of 11,792 cars under the week before but 29,264 cars above the same week in 1925. Compared with the same week in 1924, it also was an increase of 16,764 cars.

Ore loadings totaled 11,262 cars, a decrease of 108 cars below the preceding week and 1,613 cars below the corresponding week in 1925. Compared with the same week in 1924, it also was a decrease of 2,587 cars.

A comparison by weeks follows:

	1926	1925	1924
January 2	741,239	467,098	706,282
January 9	907,119	934,170	871,023
January 16	936,655	934,022	894,851
January 23	921,734	924,291	891,481
January 30	925,263	897,368	929,623
February 6	914,904	929,130	906,017
February 13	917,144	903,935	935,589
February 20	931,743	925,886	845,699
February 27	912,658	864,096	944,514
March 6	964,681	932,054	929,331
March 13	967,411	915,119	916,767
March 20	977,209	911,481	908,380
March 27	967,838	932,769	907,389

Producing Pulverized Rock Phosphate By the Shrinkage System

ALTHOUGH pulverized rock phosphate has been used in the east for many years it is new in the west. However, the rancher and fruit grower on the Pacific coast are beginning to realize the necessity of fertilization and the business of the Cokeville Phosphate Company at Cokeville, Wyoming is growing rapidly and it now markets its product in California, Oregon and Washington.

The phosphate rock in this section occurs in a vein about six feet wide, standing at an angle of 75 degrees. The rock is mined by the shrinkage system and as it is taken out of the stopes on the lower level it is filled in from a stope above. In this manner the lower stopes are always kept full of mine run rock ready to be trammed out to the mill. This assures an ample supply of rock on hand at all times.

As this is a new business in this part of the country the company has not built an enormous plant but as the venture grows new units can be added easily as the plant was erected with that end in view.

The company is mining about 100 tons daily using two Waugh stopers manufactured by the Denver Rock Drill Manufacturing Company to drive the stopes and a Sullivan jack hammer

Entrance to the Mine

Cokeville Phosphate Company's Plant

for the new development that is necessary as the main tunnel must be kept ahead of the stopes above.

As they are only working 700 feet from the entrance of the lower tunnel the ore is trammed out by hand using ½ ton Truax cars but the size of the cars will have to be increased shortly to keep the tramming costs down to a minimum. The tramming tracks have a sufficient grade for the load to roll out by gravity and the only really hard work on this job is pushing the empty car back into the mine for another load. The load is dumped on to a grizzly as it comes out of the mine where it is broken by sledges to sizes which can be handled in a California Iron Works 7x9 jaw crusher of the Blake type which is fed by hand. The rock flows by gravity to the crusher and is then picked up by an elevator made by the Bodinson Manufacturing Company so that it again flows by gravity chutes directly to a rotary dryer which dewaters it to a point where it contains less than 1 per cent moisture as it leaves. The material is then picked up on a belt conveyor manufactured by the Jeffrey Manufacturing Company and brought back by a Bodinson elevator into a storage bin especially lined to receive the hot rock. From there is flows by gravity to the pulverizer. The belt carrying this hot rock was manufactured by the Goodrich Rubber Company with an asbestos lining.

From the storage bin mentioned above the rock goes to a Fuller-Lehigh mill where it is pulverized so that 95 per cent will pass a 100 mesh screen and 65 per cent will pass a 200 mesh screen and from the mill the pulverized rock is again elevated and carried by a Bodinson screw conveyor to a system of storage bins which will hold about 1,100 tons and all connected above the main drive way so that the trailmobiles hauled by a Fordson can be loaded by gravity.

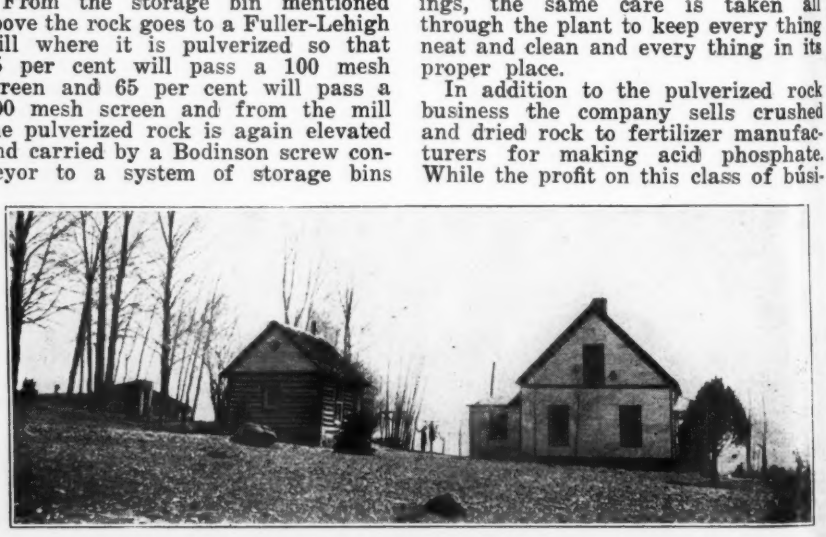
On one side of the drive there is a bagging room which will hold about four car loads of bagged material but the larger part of the product is shipped in bulk being shoveled from the trailmobiles directly into box cars and sent to the Pacific coast.

This method will be changed as the business has outgrown the present system. Storage bins will be erected at the railroad station which is about two miles from the mine and the rock will be dumped from trucks directly into an elevator and carried to an Ottumwa box car loader which will do away with all hand shoveling, until it is delivered to the user.

The plant is completely electrified, power being furnished by the Cokeville Light and Power Company at 13,200 volts and stepped down to 440 volts by a bank of General Electric transformers which are completely enclosed in a building by themselves. Each operation is controlled by a separate motor, six of which are General Electric and one a Crocker-Wheeler. A Sullivan single stage compressor furnishes air for the mining operations and an Ingersoll-Rand Leyner sharpener takes care of the dull steel as it comes from the mine.

The grounds around the plant are kept in immaculate condition with graveled walks between all the buildings, the same care is taken all through the plant to keep every thing neat and clean and every thing in its proper place.

In addition to the pulverized rock business the company sells crushed and dried rock to fertilizer manufacturers for making acid phosphate. While the profit on this class of busi-



Company Houses Provided for Employees

ness is small it helps to reduce the overhead and also to keep the plant in operation every day in the year.

F. M. Bresee, president and general manager of the company is the active head and it is due to his work and ability that a market for pulverized rock has been developed on the Pacific coast, and as the output of the mine is sold on five year contracts a steady market is assured and with no excessive selling costs the price is held down to a low figure which is again reflected in the price which the rancher has to pay for it.

The original plant was built in the fall of 1923. In that year only four cars were shipped. In 1924 the output grew to 29 cars and in 1925, 149 cars were loaded. There is every prospect that the business will be doubled this year.

Graphite Disc Electric Control

Graphite disc electric controlling apparatus has been on the market since 1902 and has come into prominence more and more during recent years, possibly because of its wide application in radio, but also because of its utility in the industrial field. The Allen-Bradley Company now builds automatic and manual starters for both A. C. and D. C. motors, crane and hoist controllers, reostats for all applications, including laboratory work and overload relays of various types. Besides this, it has several numbers for the automotive and radio fields.

The crane and hoist controllers can be adapted for any other duty in which constant starting, reversing and speed control where extraordinary ability to withstand severe conditions is required. Due to the large range of resistance available a very slow start and gradual acceleration can be accomplished under different load conditions.

The operating part of the controller consists of several Bradley unit graphite disc compression resistors, a compression mechanism, magnetic contractors, a drum pilot switch and operating lever. The Bradley unit resistor consists primarily of a column of graphite discs contained in a steel tube lined with insulating material. When the column is under no pressure the contact resistance between the discs is very high. Upon applying pressure to the column the resistance decreases until with a moderately heavy pressure the contact resistance has practically disappeared.

New Motor Driven Trolley

A new motor driven trolley has been developed by the American Engineering Company for use with its half-ton and one-ton Class A, "Lo-Hed" electric hoists, which have been built heretofore in bolt-suspension and plain trolley types only.

New Motor Driven Trolley

The trolley can be supplied with travel speed of 80 or 120 feet a minute, so that the trolley and hoist provide an inexpensive overhead system for handling loads of one ton or less at high speed, both in lifting and moving. Its accurate control makes it efficient in spotting work for machine tool operations. It can be arranged for remote control, if desired. Any Class A, "Lo-Hed" hoist now in service can be easily converted into a motor-trolley hoist by adding the new trolley.

Only 22-inch headroom is required for hoist and trolley, which is very small for a motor trolley hoist. The trolley is ruggedly built and maximum traction is obtained by driving all four wheels. The three main castings, from which the hoist and load are suspended, are of cast steel. The spur gear drive is totally enclosed and runs in an oil bath. Hyatt roller bearings are used on all shafts. The motor also is totally enclosed and has high grade ball bearings. All parts are completely accessible and the motor can be removed readily when necessary. The motor can be furnished for D. C. or A. C., either 2 or 3 phase.

New Incorporations

Batjes Gravel & Sand Co., Grand Rapids, Mich. Capital, $50,000.

Evans Supply Mfg. Co. (cements). Capital, $10,000. B. F. Maged, 320 Broadway, Manhattan, N. Y., Atty.

Globe Rock Asphalt Co., Wilmington, Del. Deal in rock asphalt and other asphalt. Capital, $200,00.

Marshall Sand Company, Black Mountain, N. C. Three hundred shares common stock without par and $30,000 preferred stock.

Pullman Building Company, 57 E. 101st Place, Chicago, Ill. Capital, $25,000. Manufacture and deal in building material of all kinds. Incorporators: E. B. Anderson, Hans Erickson and Arthur W. Anderson. Correspondent, Harry C. Kinney, 160 N. La Salle St.

F. W. Traeger & Sons, Montclair, N. J. Capital, $125,000. Mill work, building materials, etc. Frank W. Traeger, Frank G. Traeger, Anthony J. Traeger, Montclair, N. J.

Mooresville Gravel Company, Mooresville, Ind. Capital, $10,000. Operate sand and gravel pit. Directors: Joseph N. Morgan, James M. Manker, W. Arthur Hadley.

Ponca City Rock and Sand Co., Ponca City, Okla. Capital, $10,000. A. L. Bogan, William Brantingham and A. E. Warren, incorporators.

The Albany Moulding Sand Company, Albany, N. Y. Deal in moulding sand, gravel and to manufacture foundry products. Capital, $500. Incorporators: Louis F. O'Neill and Arthur N. Blair of Albany, and Josephine F. Wood of Rensselaer, N. Y.

Washington Cement Co., Seattle, Wash. Capital, $10,000. Incorporators: Phillips Morrison, Arthur G. Smith and F. R. Bates.

Dayton Gravel & Sand Company, Dayton, Ohio. Capital, $10,000. Incorporators: E. W. Campbell, Wayne F. Lee, Esther Rehmund, U. S. Couck, A. H. Wetecamp.

Georgia Portland Cement Corp. Capital, $5,000,000. H. M. Neil, Augusta, Ga., incroporator.

The Bremen Cement Tile and Block Company, New Bremen, Ohio. Capital, $20,000. Frank Neikamp, Alma and William Scheer, Louis Huenke and Julius Niekamp, incorporators.

Independent Cement Block & Material Co., Roseland, N. Y. Capital, $12,000. Paul E. Sigler, Caldwell, N. Y.; Edwin T. Taylor, Jr., Roseland, N. Y., and Harold K. Pier, Caldwell, N. Y., incorporators.

Hampton Gravel Corp., Southampton, N. Y. Capital, $6,000. J. D. Stager, L. P. Ward and I. Shalsey, incorporators.

The Buck Hill Washed Sand & Gravel Co., Canton, Ohio. Capital, $50,000. Herbert C. Taylor, W. G. Ashbrook, Helen M. Light, E. H. Benson, William T. Kirk, incorporators.

Marion County Sand and Gravel Co., Inc., Indianapolis, Ind.; 150 shares, no par value. (Digging for sand and gravel.) Directors: Art E. Eaton, Bascom O'Hair and Roland Lane.

Philadelphia Concrete Products Co., Wilmington, Del. Manufacture cement, lime, plaster and artificial stone. Capital, $200,000.

The New Foote Bros. Catalog

The new general catalog of the Foote Bros. Gear and Machine Company, of Chicago, which has been in the course of preparation for about eighteen months, has now been completed and is in the hands of the printer. It is expected that it will be available for distribution about the middle of May.

This catalog, in addition to being a complete price list of the company's spur and worm gear speed reducers, flexible couplings, sprockets and industrial gears of all kinds, contains a wealth of engineering information on gearing transmission and mechanical engineering subjects that makes it very valuable as a reference book.

Hyman-Michaels Buys Defunct Railroad

The Hyman-Michaels Company of Chicago have acquired all the rails and locomotives of the defunct Kansas City and Northwestern Railroad, whose terminals were at Kansas City, Kansas.

The purchase ends a controversy which has been interesting railroad circles and officials since 1919 when the road ceased operating. The stockholders have been seeking to dispose of it ever since.

The equipment is in good condition and is being offered to the public through regular channels. The dismantling of this railroad will commence immediately and is expected to be finished before the end of 1926.

Will All the Railroads Eventually Produce Their Own Ballast?

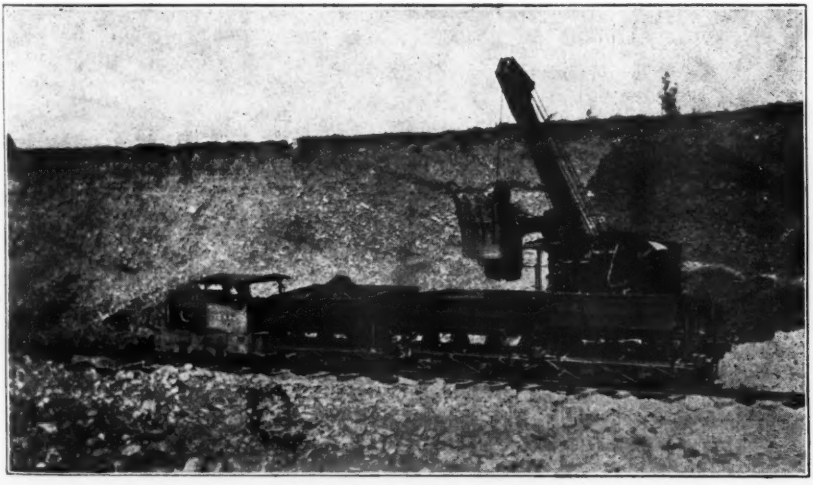
DURING the past few years there has been a firm desire upon the part of the railroads to reduce operation expenses wherever possible. Considerable thought has been given to the problem of ballast. In several instances the expense of maintaining road beds has provoked some sharp discussion. The ballast problem with some railroads is an acute one. What will a close study on the part of the railroads lead to? The Great Northern Railroad has already taken the problem to task by building two sand and gravel plants and has made plans to build three more this season. This step has gone beyond the experimental stage. Will the success of the Great Northern influence the other railroads? Let us consider what has been done by the Great Northern.

The program outlined by C. O. Jenks, vice president of the Great Northern Railroad, contemplates the development of plants at favorable locations and the first of these have been built at Chinook and Warland, Montana. The interesting point is that these plants were built by the J. L. Shiely Company of St. Paul who are well known in both the crushed stone and the sand and gravel industry for the efficiency of their own plants. The J. L. Shiely Company are in a position to render a valuable service as a result of their own experience in plant operation. In addition to supplying their own needs the Great Northern Railroad will endeavor to develop a commercial business.

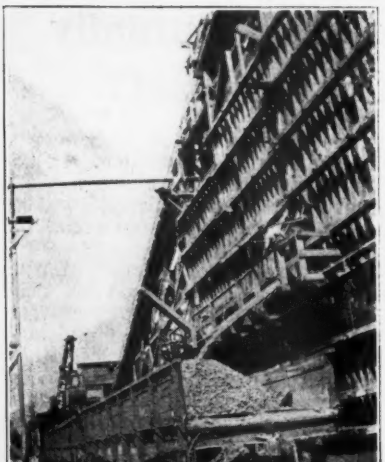
The plant at Warland, Montana, represents an investment of nearly $150,000. Warland is a picturesque spot near the Idaho line with wood covered foot hills behind it and towering mountains beyond. An exceptionally good grade of gravel was discovered. The plant site was selected because of its accessibility and the fact that no stripping is necessary. The efficiency of the plant is attested by the fact that last season nearly a thousand yards of gravel and 350 yards of sand were produced each day.

The plant was constructed with an idea of economy in production rather than low initial cost and J. L. Shiely, who operated the plant at its inception is authority for the statement that the cost figures have fully justified the investment. The plant which is expected to open within a few weeks for the 1926 season is now under the direction of A. J. Jones, representing the railroad.

The bank being worked covers 90 acres and averages 20 feet in depth. It is worked by a 30-B. Bucyrus gaso-



Shovel Working in the Bank

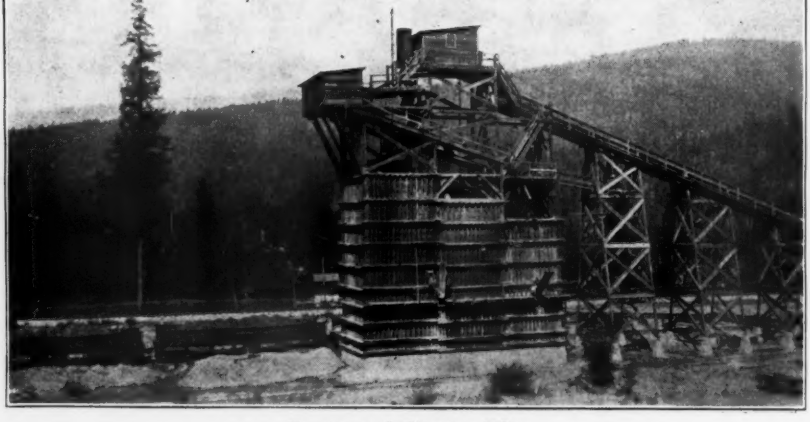


Loading Ballast Into Cars

Rail Grizzly at Warland

line shovel on caterpillar tractors and equipped with a 1⅛ yard dipper. The shovel digs from the face of the bank and empties into Koppel cars of five yard capacity and the material is hauled to the plant by an 8-ton Whitcomb locomotive. The cars are dumped over a grizzly of rails which holds back the boulders allowing them to be broken with a hand sledge. From the grizzly the material falls to a hopper which feeds to a 24-inch conveyor belt. This belt carries the material to a 14-inch Allis Chalmers McCully primary crusher.

From the primary crusher the material is dropped to the ground level and picked up by another 24-inch belt conveyor and delivered to two 6-inch Allis Chalmers Superior McCully fine reduction crushers housed in a structure which is an almost exact duplicate of the primary crusher house. Gravity again is utilized to take the crushed material to a long 24-inch conveyor belt which transports it to



Screen and Storage Bins

the washing and screening house. After being washed and screened the material falls to three storage bins. These are located alongside the tracks of the Great Northern Railroad and the cars are loaded by gravity through spouts.

Water has been furnished for the washing operation by a 3-inch Fairbanks-Morse centrifugal pump but because of a need for additional water this is being replaced this season with a 6-inch pump of the same make.

The plant is layed out to employ gravity wherever possible and the arrangement has been highly successful. The plant is electrically operated, the power being generated in a plant on the ground. A Buckeye steam engine with condensers and water heater furnishes 300 horse power to run an alternating current generator. A 75 h.p. motor runs the primary crusher and the two secondary crushers are each driven by a 50 h.p. motor. A 60 h.p. motor drives the screens.

The sand and gravel is used promptly by the railroad but during the necessary delays between the time it is produced and can be utilized for ballast, the material is loaded on cars and stored on switch tracks. A steam locomotive is used to haul the cars to and from the switch tracks.

A locomotive crane is used for stock piling to take care of concrete work and to pile for open storage when sufficient cars are not available for storage by the other system. On an average 28 cars of gravel and 14 cars of sand are loaded each day.

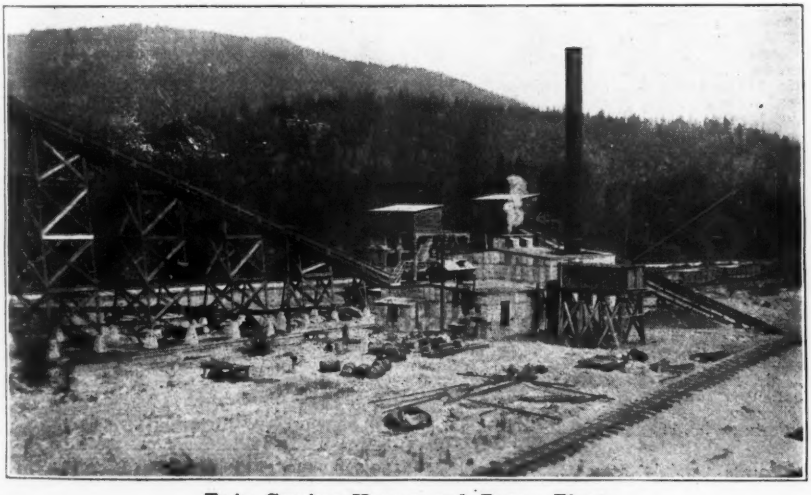
Fuller Company Is Formed

Organization is announced of the Fuller Company, with headquarters at Catasauque, New York, for the purpose of handling the Fuller Kinyon system for materials other than pulverized fuel. In connection with the recent sale of the Fuller-Lehigh Company to the Babcock and Wilcox Company, this part of the business was not included. The Fuller-Lehigh Company, however, has been granted the exclusive rights to this system for conveying pulverized fuels only, and all matters pertaining to the conveying of pulverized fuel should be taken up with the Fuller-Lehigh Company, Fullerton, Pa.

P. F. Stauffer, formerly sales manager of the Fuller-Lehigh Company, has taken the similar position with the Fuller Company, and the balance of the Fuller Company organization consists of experienced Fuller Kinyon pump engineers and operators. The Fuller Company will solicit and handle all business in connection with the conveying of materials other than pulverized fuel.

Litchfield Elected President Goodyear Company

P. W. Litchfield, senior vice-president of the Goodyear Tire and Rubber Company, has been elected president to succeed the late George M. Stadelman. Mr. Litchfield has been with the organization for twenty-five years. E. G. Wilmer, New York partner of Dillon, Read and Company, continues as chairman of the board.



Twin Crusher Houses and Power Plant

Available Funds Point To Big Road Program

A fund of $598,590,948 is available to the state highway departments of the nation during the coming year, according to estimates compiled by the Bureau of Public Roads of the United States Department of Agriculture. Of this sum, $461,515,400 is for construction and $137,075,548 is for maintenance.

These funds will provide for the construction of 6,751 miles of asphalt, concrete and brick paving, 14,320 miles of sand clay, gravel and macadam, and 8,145 miles of improved earth roads. The various states also plan 234,582 miles of highway. A total of $1,030,286,948 is available for the construction and maintenance of all rural roads. These figures indicate the 1926 highway program will equal if not exceed the progress in any previous year.

The total expenditure by counties and local units for both maintenance and construction is estimated at $431,696,000, which is less than the similar estimate made one year ago by about $31,000,000. This reduction is more than offset, however, by the increase of more than $58,000,000 in funds estimated as available to the state highway departments. For a number of years there has been a trend toward placing control of all important state roads in the hands of the state highway departments.

Funds available as reported by the various states and the portion of the state funds derived from Federal aid are as follows:

	Probable Expenditure by State Highway Departments.	Federal-Aid Funds Available to States.*	Probable Expenditure by Local Authorities.
Alabama	$ 9,900,000	$ 3,547,911.69	$12,000,000
Arizona	4,200,000	3,084,742.68	630,000
Arkansas	6,500,000	1,534,751.77	9,000,000
California	14,000,000	4,248,299.76	23,000,000
Colorado	4,550,000	3,285,370.65	5,000,000
Connecticut	7,785,289	1,611,062.57	2,500,000
Delaware	2,930,000	367,537.65	900,000
Florida	14,000,152	1,400,910.74	18,000,000
Georgia	7,324,750	1,931,087.02	13,000,000
Idaho	2,837,000	1,271,409.28	1,500,000
Illinois	46,200,000	6,674,248.74	20,000,000
Indiana	13,200,000	2,382,667.87	40,000,000
Iowa	13,584,108	4,028,631.46	16,000,000
Kansas	9,072,000	3,073,831.15	10,000,000
Kentucky	12,000,000	2,486,349.23	10,000,000
Louisiana	9,250,000	1,856,350.57	7,000,000
Maine	8,983,400	1,513,478.38	3,900,000
Maryland	7,116,398	654,830.74	3,200,000
Massachusetts	13,000,000	2,673,200.94	12,000,000
Michigan	11,500,000	4,603,378.63	22,000,000
Minnesota	21,500,000	2,111,863.44	6,500,000
Mississippi	6,250,000	1,698,458.08	6,000,000
Missouri	28,076,000	2,600,235.10	12,000,000
Montana	1,350,000	5,714,746.27	1,000,000
Nebraska	6,500,000	3,941,841.00	8,500,000
Nevada	1,670,000	1,049,593.49	400,000
New Hampshire	3,550,000	511,347.83	1,500,000
New Jersey	22,900,000	985,680.83	8,300,000
New Mexico	3,555,553	2,750,373.17	200,000
New York	35,750,000	6,938,224.36	26,641,000
North Carolina	16,000,000	1,715,137.99	10,000,000
North Dakota	5,450,000	2,506,152.20	3,500,000
Ohio	25,500,000	4,502,826.16	20,000,000
Oklahoma	10,000,000	1,894,068.61	12,000,000
Oregon	7,000,000	1,319,943.74	7,000,000
Pennsylvania	63,550,000	3,699,149.10	12,500,000
Rhode Island	3,790,000	675,753.65	875,000
South Carolina	5,540,000	892,885.46	2,500,000
South Dakota	3,350,000	1,282,672.87	5,250,000
Tennessee	18,000,000	2,374,596.79	9,000,000
Texas	28,000,000	4,979,640.84	16,000,000
Utah	3,640,798	1,502,010.18	500,000
Vermont	3,530,000	801,796.98	700,000
Virginia	10,285,500	1,481,535.84	2,600,000
Washington	9,000,000	1,527,002.22	11,000,000
West Virginia	13,750,000	912,454.24	6,000,000
Wisconsin	20,970,000	5,143,634.95	10,700,000
Wyoming	2,200,000	1,024,811.51	900,000
Totals	$598,590,948	$118,768,488.42	$431,696,000

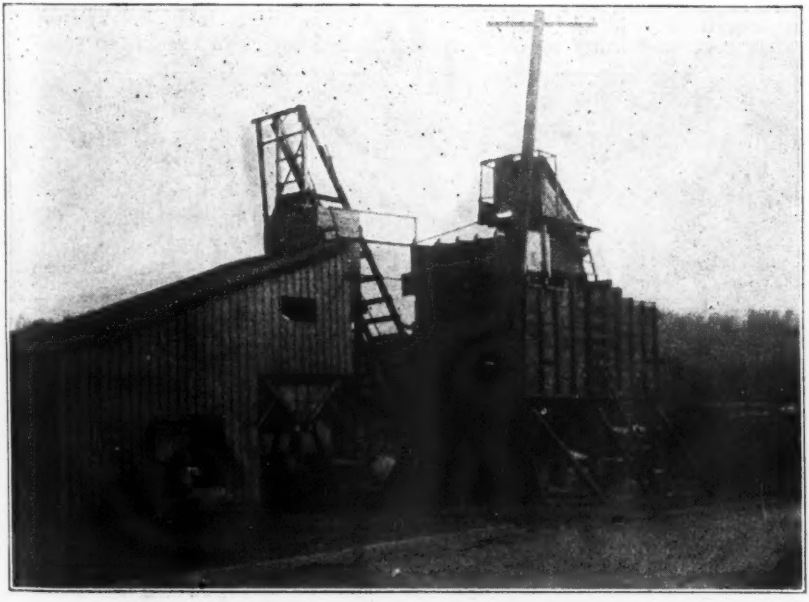
*Included in total probable expenditure by state highway departments.

Dredge Shifting Reduced to a Minimum By Taking Advantage of Rains

NATURAL conditions such as the Merrill Material Company have been able to take advantage of occur with more frequency than is generally supposed. This company operates a suction dredge in the Guyan River which flows through the city of Huntington, West Virginia, and empties here into the Ohio River. The material dredged is a disintegrated sandstone sand which is brought down from the mountains with each freshet. The supply is thus replenished regularly so there have been very few occasions for moving the dredge. The sand has very few pebbles or large stone. It makes a very desirable product for wall plaster and brick mortar. It is also an excellent fine aggregate for asphaltic concrete. There are several instances throughout the country of other operations where advantage is taken of the rains in locating the dredge unit.

The dredge was built at the site of operation. It is 44 feet long, 20 feet wide and 30 feet deep. It is decked over and a single cabin protects the machinery and the operator. The dredge pump is a 6 inch heavy duty Morris directly connected to an 85 h.p. Westinghouse two speed motor 440 volt 1,800 r.p.m. The pump is so placed that the suction pipe leads directly out from the pump and overboard without the use of any elbows in the suction line. The suction pipe is raised and lowered by a worm geared hoist operated by hand. The pump is bottom discharge and the material excavated is carried back through the boat to the back end and over pontoons to the bank and then up the slope of the bank about 200 feet to the screening plant a height of 65 feet above the water level.

The screening plant consists of one screen 4 by 10 feet set on an angle of 30 degrees in a steel frame with a ¼ mesh wire cloth. This screen is placed directly over a steel settling tank 4x4x12 feet. The tank is equipped with automatic spring valves which release the sand to storage bins below. The overflow of water from the settling tank passes to a trough under the lower edge of the screen



General View Showing Mortar Plant Adjoining Washing Screen and Bins

Plant, Showing Ground Storage

where it picks up the rejects from the screen and flows back to river some distance from the dredge through an enclosed box trough.

A Myers 5 h.p. belt driven plunger pump is used to prime the pump and to siphon out the hull of the dredge boat. Electric power is purchased from the Consolidated Light and Power Company. This power is generated 12 miles from the plant and as it comes in at 2,300 volts it is reduced to 440 volts. It is carried from the transformer to the motors by a rubber covered mining machine cable which lies in the water or wherever it may happen to fall.

The plant has been operated with only one man who controlled the pump. As much as 160 yards of material have been pumped in two hours and fifteen minutes. This is considerable more than the rated capacity of the pump. In storing the sand for ground storage it is run out from the valve in the bottom of the settling tank through a 6 inch, 60 foot wrought iron pipe with 2 inch holes spaced 12 inches apart in the lower side. This

Sand Comes to This Barge

arrangement permits 2,500 yards of ground storage.

A ready mixed mortar plant is also operated. Sand is taken from storage to the top of the mortar plant where it is automatically dumped into a bin over a measuring hopper. From this hopper the correct amount of sand is drawn into a 14 cubic foot Blystone mixer which is driven by a 10 h.p. Westinghouse motor. There are four mortar bins directly under the mixer. These mortar bins contain the different colored mortars which are loaded directly into trucks that pull up under the bins. Masons hydrate received in bags is used in making the mortar. The company operates a fleet of six trucks for delivery of material. William H. Merrill owns and manages the Merrill Material Company. He was at one time general manager of the West Virginia Sand and Gravel Company, of Charleston, and recently general manager of the Wilson Sand and Supply Company of Huntington.

Next Safety Congress

The fifteenth annual safety congress will be held at Detroit from October 25th to 30th, according to an announcement by W. H. Cameron, managing director of the National Safety Council with headquarters in Chicago.

N. K. Wilson Makes Change

The Waukesha Lime and Stone Company, Waukesha, Wisconsin, producers of sand, gravel and crushed stone and manufacturers of pulverized rock products, announce the appointment of N. K. Wilson as general sales manager and the opening of a Milwaukee sales office at 3002 Plankinton Building, April 1, 1926.

Mr. Wilson, formerly executive secretary of the Wisconsin Mineral Aggregate Association, is an associate member of the American Society of Civil Engineers and a graduate of the University of Illinois and has been active in the highway building trades in Wisconsin for the past twelve years.

Climax Appointments in Northwest

J. L. Latture Equipment Company, 354 Belmont Street, Portland, Oregon, have been appointed sales representatives of the Climax Engineering Company. The J. L. Latture Equipment Company have as sales territory the states of Oregon, Washington, and Idaho. A carload shipment, consisting of a complete line of Climax Engines and parts has already been sent them so that their customers will be in a position to receive immediate shipment and their requirements may be met without delay.

Trucks Ready to Distribute Material

New Dredge Enters Allegheny River

RECOGNIZING the demand of the Pittsburgh industrial district for clean sand and gravel for concrete aggregate and looking ahead to the road demands of the north central part of the state, three business men from that city last summer organized the Allegheny Sand and Gravel Company. Their foresight has been more than justified, for the state highway department has approved their material, which is considered especially adapted for that kind of work, as well as for the general masonry and concrete trade.

The men are John H. Hudson, president of the concern; W. Rex Cullison, vice president, and Clark J. McKee, secretary-treasurer. Their company is incorporated for $50,000 and has a production capacity of 2,000 tons daily. It is located at West Hickory, in Forest county, Pennsylvania, 165 miles north of the steel city, but the offices of the company are in Pittsburgh.

The corporation was organized in April of last year and the first car load of material from the bottom of the Allegheny river was shipped out over the Pennsylvania railroad on July 21. The sand and gravel are dredged from the river by a bootjack type sand digger fixed on a wooden barge. This barge is a product of the community, being built by the Forest Barge Company of Tionesta, Pennsylvania, at their docks a half mile above the spot where the barge is now operating. The hull is 125 feet long by 30 feet wide and is made of pine cut from the woods of the neighborhood.

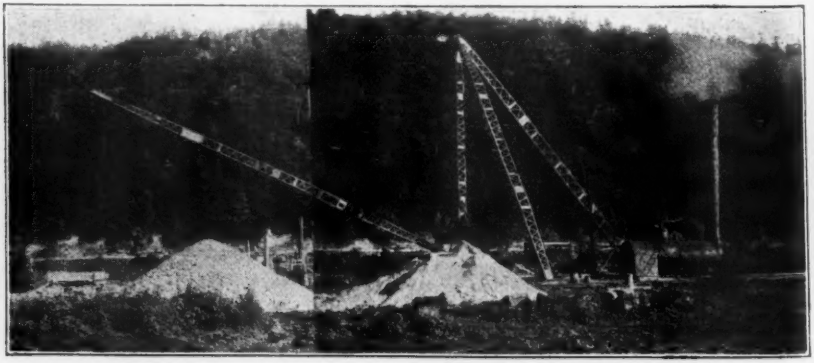
The flotilla of the company consists of five other barges, a small coaler for operating the digger, and four 30x90 bottoms, two of which are used for gravel and the others for sand.

Nature has graded the sand and gravel and scoured it, leaving it ready for man to lift it from the river bottom. The sand digger is equipped with half-yard manganese steel buckets. Power is steam supplied by a 150 h. p. boiler. Besides the 12x48 steam engine there are four other engines on the barge used for various purposes.

The material dug from the river bottom is loaded directly onto the barges, which are towed to the company's shore plant. This is an all-steel hoist with a 65-foot mast and 100-foot boom. This hoist is equipped with a 1½-yard Erie clamsnell bucket, manufactured by the Erie Steel Construction Company. This is run by a 10x12 Clyde engine and 125 h. p. boiler.

The clam shell loads directly into cars or trucks, as delivery purposes demand. The company supplies a local market, as well as that of the Pittsburgh district. In order to take care of the railroad shipments the company was forced to build a side track of 85-pound rails 1,000 feet long from the Pennsylvania Line's tracks. They also put in the foundation work for their hoist.

Ice is a serious problem in this section of the river during the winter and spring months and to protect the barge ice breakers, 18x18 and 20 feet high, have been built up stream from the harbor. During last summer's operations the barge crew worked in the open, but as winter approached a roof and cabin were added to the digger.



Land Plant of the Allegheny Sand and Gravel Company

A Canadian Marble Crushing Plant

TEMPERATURES which drop below zero, remaining there for weeks at a time and even an occasional fall to twenty-five below can not stop the operation of the White Star mine, a crushed marble operation at Haliburton, Ontario. This picturesque little town is situated 125 miles north of Toronto and is in the heart of the lumber and stone district of the province. It is a terminal point for the Canadian Northern railroad and has excellent transportation facilities for both lines of endeavor.

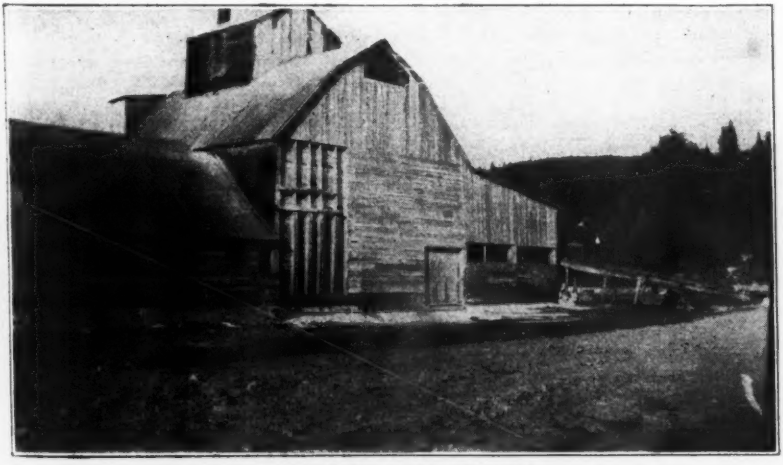
Both marble and red granite are found in abundance in this territory. The White Star mine, which is operated by Charles E. and P. H. Bolender, is located at the edge of the village near Head Lake and has been in operation since 1914. The crushed and pulverized marble has many markets and is shipped by freight all over Canada. The chips are used for roofs, terrazzo floors, artificial stone, stucco dask, ornamental concrete work, walks, poultry grits, agricultural lime, marble flour, asphalt filler dust, paint fillers, etc.

At present the work is open quarry entirely. Both white and blue marble are found here, which permits the Bolender brothers to offer a wide range of artistic materials to customers desiring beautiful effects in concrete. No dimension stone is quarried, although the top of the quarry face is badly cracked up, a circumstance which aids rather than hinders production at this stage. As the pit goes deeper it tightens up and is solid at fifty feet.

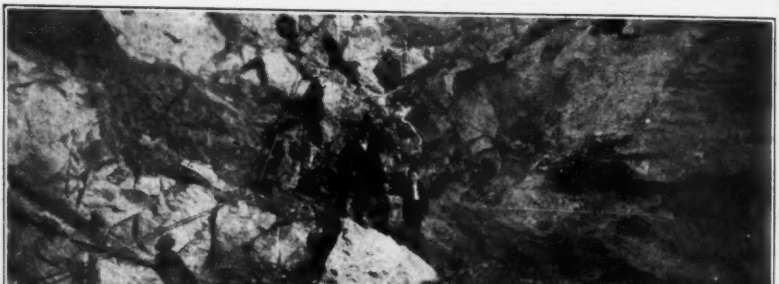
The face of the quarry is now 100 feet high. The drilling is done by Ingersoll-Rand jackhammers and every effort is made to shatter the rock as thoroughly as possible by the shots. That which can not be reduced to a size one man can handle by the blasting is shattered by sledges. Dump cars run on tracks onto the quarry floor and haul the stone to the mill, which is only a hundred feet away. In the mill the contents of the cars is emptied into an 8x16 Sturtevant jaw crusher, which is set at one-half inch. A scalping screen next separates the stone and sends all fragments below ¼ inch to vibratory screens. Here the finer particles are separated into three sizes, that passing an 8 mesh, 10 mesh and 20 mesh. From the screen this finished product goes directly into bins.

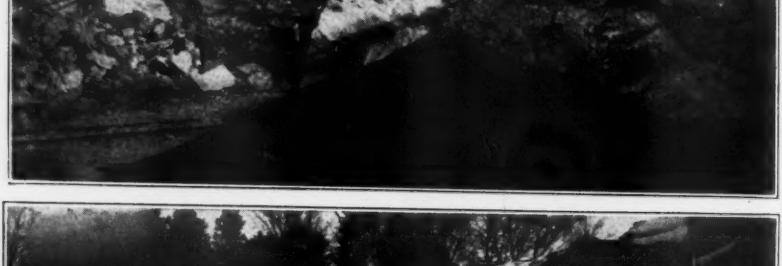
Returning to that stone above ¼ inch which did not pass the scalping screen, this is sent to a circular screen which separates into ¾, ⅜, 5/16 and ¼-inch sizes. From the screen these sizes are taken to storage bins and the tailings of the screen are sent to a Sturtevant roll crusher and reduced to pass a 20-mesh screen for feed for a Sturtevant 36-inch vertical emery mill. The product of this mill is used for industrial fillers.

Eight different grades of product are made at the plant. All shipments are in 100-pound bags. The capacity of the plant is 100 tons in ten hours.



A View of the White Star Mill





Three Quarry Views

New U. S. Gypsum Product

To meet the demand of the plastering trade, architects and builders for an inexpensive colored interior plaster which can be applied with the ordinary tools of the plasterer with a minimum of necessary precautions, the United States Gypsum Company has developed a colored sand-float finish plaster, called Plastint.

It is a plaster tinted with mineral pigments which assure uniform and permanent color-tone. It requires the addition of water only on the job. It is washable with soap and water without the application of a surface-coat of size. It is made in nine colors—cream, gold, pearl, buff, grey, tan, blue, green, rose—and white.

Shipped in 80-pound paper bags, which assure good storage qualities, its coverage is from 175 to 200 square yards per ton. Rough, medium or smooth float finishes may be produced by the use of cork, wood, carpet or felt floats. Because of its all-mineral composition and the even diffusion of pigment obtained by factory-mixing, it eliminates the danger of uneven colors which confront plasterers using job-mixed colored materials.

To prepare a wall or ceiling for Plastint, the usual plastering grounds are used, and the base-coats are brought to ⅛ to 1/16 inch of the grounds. The base-coats are broomed thoroughly after darbying to provide a strong mechanical bond with the finish-coat. The colored finish is applied 12 to 24 hours after application of the case-coat, while the latter is "half-green." If the base has become bone-dry, it should be thoroughly wetted. Only a little water is used in floating.

Ten quarts of water are mixed with each bag of the colored plaster. It is allowed to soak 10 to 20 minutes and then is hoed to a creamy consistency and troweled on. A stiffening action starts about two hours after application and the set is complete in seven hours. Care should be taken to avoid re-tempering after the material has started to set.

Pittsburgh Office of Bucyrus Moved

The Pittsburgh district office of the Bucyrus Company, formerly located at 461 Union Trust Building, has been moved to 409 Commonwealth Building. As formerly, this office will be in charge of district sales manager A. R. Hance.

Westinghouse Sales Changes

A reorganization of the sales department, involving the reallocating of the managing personnel and the creating of several new activities has been announced by E. D. Kilburn, vice president and general sales manager of the Westinghouse Electric and Manufacturing Company.

The change consists of the following appointments: Assistant to vice president, E. H. Sniffin, formerly manager, power department; director of sales, T. J. Pace, formerly manager, supply department; central station manager, G. H. Froebel, formerly manager, marine department; industrial sales manager, J. M. Curtin, formerly manager industrial department; transportation sales manager, M. B. Lambert, formerly manager, railway department; assistant director of sales, A. C. Streamer, formerly assistant to manager, supply department; generating apparatus manager, H. W. Smith, formerly general engineer; traction apparatus manager, A. J. Manson, formerly manager heavy traction division, railway department; motor apparatus manager, O. F. Stroman, formerly assistant to manager, industrial department; switchgear apparatus manager, R. A. Neal, formerly head of switch section, supply department; and distribution apparatus manager, G. A. Sawin, formerly assistant to manager, supply department. The reorganization has been in course of development for some time. Its effect according to Mr. Kilburn will be to form a more flexible organization now necessary to serve and anticipate the needs of electrical apparatus users, due to the tremendous development of the industry.

Fleeger Makes New Connection

Burt Fleeger, treasurer, sales manager, and a director of Sivyer Steel Casting Company, Milwaukee, has resigned, to become associated with Oklahoma Steel Castings Company of Tulsa, Oklahoma, as vice-president.

Mr. Fleeger, who has been with the Sivyer organization since 1913, has acquired a substantial interest in the Oklahoma Company and is now located in Tulsa.

The Oklahoma Steel Castings Company is preparing plans for an extensive addition and is purchasing more equipment, which will materially increase its capacity of electric steel castings, of which it is the largest producer in the Mid-Continent fields.

Importance of Fan In Dust Collecting

Correct design and location of the fan is an important matter in the efficient operation of a dust recovery system, according to the chief engineer of Northern Blower Company.

"It is generally desirable to obtain the necessary air velocity with as slow a fan speed as is reasonably possible," the Norblo Engineer says. "There are several reasons for this. For one thing, a high speed fan is apt to produce a whistling sound while operating. This is not only annoying, but it is also a sign of excessive air-friction, and consequently of lowered efficiency. Another point to be considered in cases where a cyclone collector is used is that in the event of small fragments of suspended material being carried past the cyclone into the fan, a high-speed fan is naturally more apt to become damaged or worn by such contact than one having a lower speed and more substantial blades. This consideration is, however, of less importance where Norblo cloth screen or continous air-filter types are used, because of their higher recovery efficiency—somewhat over 99 per cent, as compared with about 87 per cent for the cyclone collector. Since, therefore, we place all fans on the suction side of the arrester, it follows that only the merest trace of dust can come in contact with the fan mechanism. A further advantage of this location for the exhaust fan is that should leaks develop at any time in the piping system, no dust can escape into the plant itself.

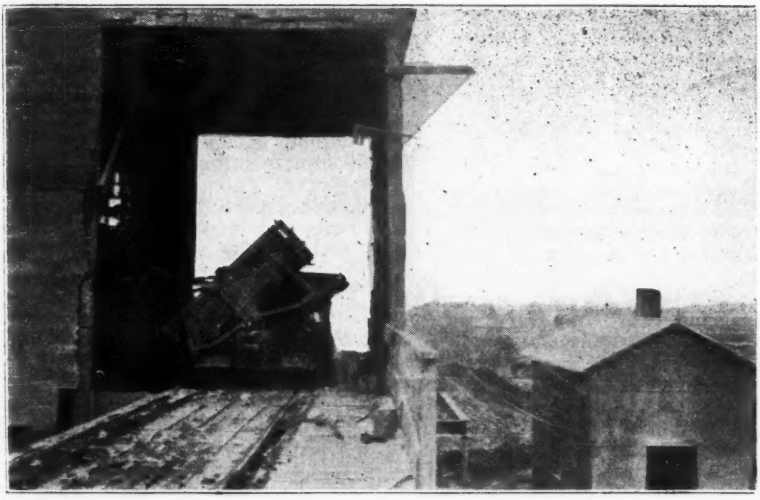
"A third point is that should the fan fail to receive lubrication and cleaning at reasonable intervals, a high speed fan is more apt to develop bearing trouble, and to do so more rapidly, than would be the case at a lower number of revolutions per minute. Vibration is more easily eliminated on a slow-speed fan, and this may mean less expensive foundations in certain cases. Of course, a slow speed fan is a larger and somewhat more expensive proposition than one of higher speed, but we have found that the former type is preferable.

"Still another point is that of reserve power. It is well known that the average fan output and horsepower rise rapidly for a small increase of speed, but that after a certain point has been reached, extra speed of the fan does not produce even a proportionate increase of capacity, because of the "slip" and the churning effe produced. It is obvious that a conse vatively rated slow speed fan is le likely to be wasteful of power shou it be necessary to increase the lo in order to take care of extensions t the piping system.

"On account of the peculiar relatio between load and speed it is necessar to be careful that the motor speed co responds closely to the requirement of the fan, both at starting and afte some hours' operation. For example a shunt wound direct current moto generally has a speed from 3 to 6 pe cent higher when warmed up than i has when cold. Thus, if the "cold" speed were taken at the normal run ning speed of the fan, a 6 per cen rise would give 12 per cent increase i fan pressure and consequently nearly 20 per cent extra load on the motor. If, therefore, the motor were not well within its capacity at the start, this increase of load will produce a heat-action which will in turn still further increase the field coil resistance, decrease the field current, and cause a further increase in speed and load in consequence. Serious trouble may thus easily result.

"In some cases we have been called upon to design installations for handling highly heated or corrosive material or fumes. If there is any possibility of these coming in contact with the fan-wheel, special precautions must be taken to prevent damage. The bearings must also be thoroughly protected and, in the case of corrosive material, the exposed parts must be coated with some metal which is not attacked by the impregnated air or spray. This is not always an easy matter, because unless the coating is absolutely continuous, local action will be set up and the complete destruction of the fan is only a matter of time. However, we have been very successful in handling jobs of this nature. Among them may be cited the handling of acid fumes in pickling rooms, the recovery and cooling of intensely heated sand from a dryer in a cement mill, etc."

Jack L. Harris, traffic manager of Fischer Lime and Cement Company, has been elected president of the Memphis Traffic Club. The organization has a membership of 5,000.



Western Dump Cars at the Crushers

"Not a Dollar Spent for Upkeep"

Western —*That's Why*

"Western dump cars are wonderful," said the manager, "we have not spent a dollar for upkeep."

Western dump cars are built for *service* and *economy*, to stay on the job and out of the repair shop. That is why many quarries are increasing their production, both in stripping and handling stone, by installing dependable Western dump cars; that is why "Western dump cars will stand more grief than any other dump cars made."

Whatever your haulage problem there is a Western car of the proper size to meet your requirements. Built in all practical sizes from 1½ cubic yards to 30 cubic yards capacity.

May we as haulage experts for nearly a half century recommend an installation and layout that will give you maximum production at a minimum cost?

Write to-day.

Western Wheeled Scraper Company

Founded 1877

Earth and Stone Handling Equipment

AURORA, ILLINOIS

Sanderson-Cyclone Purchases S W M Motor Division

The Motor Division of the Wellman-Seaver-Morgan Company of Cleveland, operated at Akron, has been purchased by the Sanderson-Cyclone Drill Company. All drawings and patterns, special machinery, tools and jigs, inventory and good will of W-S-M engines were transferred. The physical property has been moved to the new Sanderson factory at Orrville, where the engines are now being built.

Practically all former heads of the engineering and manufacturing departments of the motor division of the Wellman-Seaver-Morgan company are with the new owners in the same capacities. John Riise, formerly chief engineer, who has been largely responsibe for the design and development of W-S-M engines, now holds the same position with Sanderson. In additon, they have secured the servces of the shop superintendent and the foremen of the machinery, erecting and testing departments.

The purchase, which was made January 1, will not involve any radical changes in engineering or manufacturing policies, but has to do mainly with the manufacturing location, executive control and selling and servicing policies. The new, modern plant is located on a thirty-five-acre tract at the edge of Orrville, close to raw material markets and has excellent shipping facilites.

The manufacture of this engine fits in well with the Sanderson line of mining, quarry, construction, water well and oil well machinery—drills, tools, gasoline and steam engines—which the Sanderson Cyclone Drill Companny has been manufacturing for thirty years and which have earned the reputation of being quality products. The W-S-M engine is a four-cylinder, four-cycle, valve-in-head type motor, bore 4¾ inches, stroke 6 inches, developing 28 h. p. at 600 r. p. m. up to 56 h. p. at 1,400 r. p. m. This engine is built on a limited production basis and is strictly a quality product

Among the unusual features of the design of the W-S-M engine are the following: The cylinders are sleeves which may be removed without taking the motor from setting; the connecting rods and pistons can be replaced from either the top or bottom of the motor; the cylinder head, carrying with it as a unit the valves, rocker arms and springs, can be taken off when it is necessary to remove carbon or grind valves; two hand pole plates on each side of the motor for inspection; the design of oil pan with only one join to be gasketed permits an absolutely tight joint being made; also, the pan can be removed and replaced without injury to the gasket; the most complete oiling system found on any internal combustion engine—every moving part is lubricated under pressure, not depending on so-called oil mist, but by an actual flow of oil on every part and without the use of exposed piping; chrome nickel shaft of highest practical hardness; substantial governor with long wearing qualities, entirely enclosed and running in a bath of oil; combustion chamber fully machine finished. This, with overhead valves and exhaust manifold practically eliminates carbon deposits.

New Compressor Feature

Certain features of the Pennsylvania Class 3 A air compressors, it is claimed by the manufacturers, render them particularly suited to direct connection with synchronous motors. The practice of mounting synchronous motors directly on the shaft of large compressors of the duplex type has long been recognized as having many advantages. The practice has not been common with single cylinder center crank air compressors, however, until recent years.

One of the obvious advantages is the compactness of the unit. The motor rotor is mounted on one end of the crank shaft in place of the belt wheel and the stator is placed close to the frame of the compressor. No extended shaft or outboard bearing is required. In order to insure steady running a certain amount of fly wheel weight is needed and this is provided for, partly by the weight of the rotor at one end of the shaft, and partly by a suitable fly wheel at the other end. The wheel is mounted on the shaft with a taper fit.

The general application of the synchronous motor to small compressors has been made possible by the development of a system of control which automatically takes full charge of the starting of the motor from the minute the operator presses the button. Starting as an induction motor, it is brought up to the proper speed and at the moment it is in phase, switches on the board automatically throw it on the line at full speed as a synchronous motor.

Free Service to our readers

For the convenience of readers who are in the market for equipment, our "Free Service" department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits and quarries. The coupon below makes it easy for you. Simply check, sign and mail.

Pit & Quarry, Rand McNally Bldg., Chicago, Ill.

Pit and Quarry, Research Department,
Rand McNally Bldg., Chicago, Ill.

WE ARE IN THE MARKET for the items checked below, and would be glad to receive catalogs. prices or other information.

- ☐ Agitators
- ☐ Air Compressors
- ☐ Air Compressors, Portable
- ☐ Baffles
- ☐ Bag Filling Machines
- ☐ Bag Sewing Mach.
- ☐ Bags, Cotton
- ☐ Bags, Paper
- ☐ Ball Mills
- ☐ Barges
- ☐ Barrels, Steel
- ☐ Belt Fasteners
- ☐ Belting, Conveyor
- ☐ Belting, Transmission
- ☐ Bin Gates
- ☐ Bins, Clay Tile Storage
- ☐ Bins, Concrete Storage
- ☐ Bins, Steel Storage
- ☐ Blasting Fuses
- ☐ Blasting Powder
- ☐ Bodies, Steel Dumps for Motor Trucks
- ☐ Boiler Compound
- ☐ Boiler Skimmers
- ☐ Boilers
- ☐ Buckets, Conveyor
- ☐ Buckets, Grab
- ☐ Buildings, Portable
- ☐ Burners, Oil
- ☐ Cable Coatings
- ☐ Cableways
- ☐ Car Movers
- ☐ Car Pullers
- ☐ Car Replacers
- ☐ Car Wheels
- ☐ Cars, Bottom Dump (Gauge .....In.)
- ☐ Cars, End Dump (Gauge .....In.)
- ☐ Cars, Side Dump (Gauge .....In.)
- ☐ Cars, Steel Gondola
- ☐ Castings, Special Metal
- ☐ Chain Drive
- ☐ Chain, Conveyor
- ☐ Chain, Steam Shovel and Dredge
- ☐ Chaser Mills
- ☐ Chutes and Liners, Metal
- ☐ Classifiers
- ☐ Clips, Wire Rope
- ☐ Clutches
- ☐ Controllers, Electric
- ☐ Conveyor Equipment
- ☐ Conveyor Rollers
- ☐ Couplings, Flexible
- ☐ Cranes, Electric Traveling
- ☐ Cranes, Jib
- ☐ Cranes, Locomotive
- ☐ Cranes, Traction
- ☐ Cranes, Truck
- ☐ Crusher Parts
- ☐ Crushers, Disc
- ☐ Crushers, Gyratory
- ☐ Crushers, Hammer
- ☐ Crushers, Jaw
- ☐ Crushers, Roll
- ☐ Derrick Swingers
- ☐ Derricks
- ☐ Dippers
- ☐ Draglines, Cableway
- ☐ Draglines, Revolving Boom
- ☐ Dragline, Scraper
- ☐ Dredges, Dipper
- ☐ Dredges, Land
- ☐ Dredges, Sand Suction
- ☐ Drill Steel
- ☐ Drilling Contractors
- ☐ Drill Sharpening Machines
- ☐ Drills, Blast Hole
- ☐ Drills, Hand Hammer
- ☐ Drills, Tripod
- ☐ Dryers, Sand and Stone
- ☐ Dry Pans
- ☐ Dump Wagons
- ☐ Dust Collecting Systems
- ☐ Dynamite
- ☐ Dynamos, Electric
- ☐ Economizers, Fuel
- ☐ Elevating Equipment
- ☐ Engineering, Construction
- ☐ Engineering, Designing
- ☐ Engines, Gasoline (H. P.....)
- ☐ Engines, Gasoline Portable Power Unit (H. P.....)
- ☐ Engines, Hoisting
- ☐ Engines, Hydraulic Pumping
- ☐ Engines, Oil (H. P.....)
- ☐ Engines, Power Plant
- ☐ Engines, Steam
- ☐ Feeders
- ☐ Fire Alarms
- ☐ Fire Alarm Systems
- ☐ Fire Brick
- ☐ Frogs and Switches
- ☐ Fuses, Blasting
- ☐ Gas Producers

(*Continued on next page*)

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Firm Name .....

Address .....

City ..... **State** .....

- ☐ Gears
- ☐ Generators, Electric
- ☐ Governors
- ☐ Grapple, Stone
- ☐ Grate Bars
- ☐ Grates
- ☐ Gypsum Separators
- ☐ Hoisting Engines
- ☐ Hoists, Chain
- ☐ Hoists, Derrick
- ☐ Hoists, Drum
- ☐ Hoists, Fordson
- ☐ Hoists, Hydraulic, Motor Truck
- ☐ Hoists, Hand, Motor Truck
- ☐ Hose, Sand Suction
- ☐ Hydrators
- ☐ Hydraulic Mining Nozzles
- ☐ Hydraulic Pipe
- ☐ Hydraulic Pumping Engines
- ☐ Hydraulic Valves (Pulpit and Indicator)
- ☐ Idlers, Belt Conveyor
- ☐ Industrial Railway Systems
- ☐ Kettles
- ☐ Kilns, Cement
- ☐ Kilns, Lime
- ☐ Lights, Carbide
- ☐ Linings, Bag and Barrel
- ☐ Loaders, Bin, Portable
- ☐ Loaders, Boom and Bucket
- ☐ Loaders, Box Car
- ☐ Loaders, Conveyor
- ☐ Locomotives, Electric (Gauge .....in.)
- ☐ Locomotive, Gasoline (Gauge .....in.)
- ☐ Locomotives, Steam (Gauge .....in.)
- ☐ Locomotives, Storage Battery (Gauge .....in.)
- ☐ Log Washers
- ☐ Lubricators
- ☐ Magnetic Separators
- ☐ Manganese Steel
- ☐ Manganese Steel Parts
- ☐ Marble and Granite Working Equipment
- ☐ Metal, Perforated
- ☐ Meters
- ☐ Mills, Chaser
- ☐ Mills, Tube
- ☐ Motors, Electric (H. P.....)
- ☐ Motors, Gasoline (H. P.....)
- ☐ Motors, Gasoline Portable Power Unit (H. P.....)
- ☐ Motor Truck Dump Bodies
- ☐ Motor Trucks
- ☐ Nozzles, Hydraulic Mining
- ☐ Nozzles, Suction Screen
- ☐ Oil Burners
- ☐ Oils and Lubricants
- ☐ Perforated Metal
- ☐ Picks and Shovels
- ☐ Pipe, Hydraulic
- ☐ Pipe, Iron
- ☐ Pipe, Spiral
- ☐ Plows
- ☐ Powder, Blasting
- ☐ Powder Magazines, Steel
- ☐ Power Transmitting Equipment
- ☐ Power Unit Gasoline, Portabale (H. P.....)
- ☐ Pulverizers, Hammer
- ☐ Pulverizers, Ring
- ☐ Pulverizers, Roll
- ☐ Pump Repairs
- ☐ Pumps, Drainage
- ☐ Pumps, Dredging
- ☐ Pumps, Sand
- ☐ Pumps, Water Supply
- ☐ Pyrometers
- ☐ Rail, Steel
- ☐ Rolls, Crushing.
- ☐ Roofing and Siding (Iron, Steel, Zinc)
- ☐ Rope, Manila
- ☐ Rope, Wire
- ☐ Sand-Lime Brick Machinery
- ☐ Scales, Automatic, Conveyor
- ☐ Scales, Track
- ☐ Scrapers, Power
- ☐ Scrapers, Team
- ☐ Screening Equipment

(See other side)

- ☐ Screens, Perforated Metal
- ☐ Screens, Rotary
- ☐ Screens, Vibrating
- ☐ Separators, Air
- ☐ Separators, Gypsum
- ☐ Separators, Magnetic
- ☐ Separators, Sand
- ☐ Sheaves
- ☐ Shovels, Electric (.....yd.)
- ☐ Shovels, Gasoline (.....yd.)
- ☐ Shovels, Steam (.....yd.)
- ☐ Speed Reducers
- ☐ Steel Barrels
- ☐ Steel, Drill
- ☐ Steel, High Speed
- ☐ Steel, Manganese
- ☐ Steel, Structural
- ☐ Steel, Tool
- ☐ Stokers, Automatic
- ☐ Stone Grapple
- ☐ Stripping Equipment, Power
- ☐ Superheaters
- ☐ Swinger, Derrick
- ☐ Tachometers
- ☐ Tackle Blocks
- ☐ Tanks, Settling
- ☐ Tanks, Steel
- ☐ Tanks, Steel Welded for Air, Water and Gasoline
- ☐ Tanks, Wood
- ☐ Ties and Timbers
- ☐ Track
- ☐ Track Scales
- ☐ Track Shifters
- ☐ Tractors, Caterpillar
- ☐ Tramways, Aerial
- ☐ Transformers, Electric
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- ☐ Tube Mills
- ☐ Turbines
- ☐ Unloaders, Bin
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- ☐ Unloaders, Conveyor
- ☐ Wagons, Dump
- ☐ Washers, Log
- ☐ Washing Equipment
- ☐ Welding Equipment
- ☐ Winches
- ☐ Wire Cloth

To be used for.....

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Firm Name .....

Address .....

City ..... **State** .....

New Caldwell Car Spotter

A new self-contained motor-driven vertical-capstan electric car spotter, called the Caldwell car spotter, has been placed on the market. The manual method of moving and spotting cars, involving the use of two or three workers equipped with pinch bars, is known to be a procedure not only costly but also extremely slow—with virtually little or no real work possible during an especially rigorous period of weather. A leading alternative, the operation or hiring of a switch engine, is also very costly.

Twenty pounds pull on the capstan, it is asserted, will serve to move a ton of weight on a straight track—three minutes time with this machine sufficing, usually, to do work that two men used to require 30 minutes to do not nearly so well.

Many other uses are possible for the machine through the 360 degree working radius of the capstan—a feature which further permits the reduction of hand labor necessary in various types of pulling and hauling jobs. Two sizes number 1 and number 2 are announced by the manufacturers. The former has a speed of 40 to 60 feet per minute, while moving one, two or three cars; and the latter size will move between three and six cars, at the rate of 26 to 42 feet per minute.

That this car spotter is rugged of build and compact in form is apparently borne out by its simple yet sturdy construction. The upper bearing of the vertical capstan shaft is especially long, to take the pressure from the rope pull. The capstan has a large flange on the lower edge, the radius of which allows it to fit over the end of the bearing. This reduces the bending moment of the shaft.

A cut steel spur pinion mounted on the motor shaft meshes with a cut cast iron spur gear on the worm shaft. The worm is of hardened steel, integral with the shaft, running in roller bearings, and with a ball bearing for taking up the end thrust. These bearings are mounted in a cast iron frame, which is bolted to a cast iron center, and there is a bronze thrust washer between the hub of the worm gear and the lower bearing of the vertical shaft.

The machine has a unique automatic oiling system. There are two reservoirs, an upper and a lower. The spur gear running the lower reservoir, brings up the oil with it which is provided with an oil sling next to the housing, which prevents the oil from being thrown out onto this side into the housing joint; but on the other side it is thrown all over the worm gear.

The worm gears, running in the lower reservoir, are lubricated in two ways: First, by the oil thrown by the spur gears over onto it; and, secondly, by the worm dipping into the circulating oil. This also lubricates the radical and thrust bearing of the vertical shaft. Three pet cocks are provided to regulate the oil level. A grease cup is provided for the upper bearing of the vertical shaft.

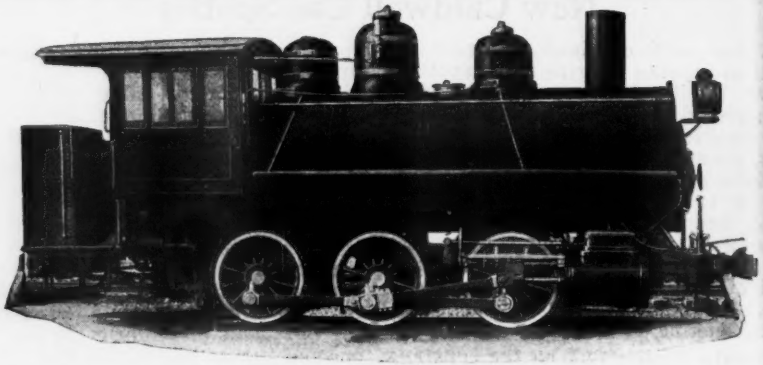
Toepfer Pit and Quarry Machinery

Correct design, durable construction and consistent performance are listed by W. Toepfer and Sons Company, as the prime essentials in pit and quarry machinery to assure satisfaction to the operator. These points are stressed in the company's new catalog which not only illustrates their line of elevators, conveyors, feeders, screens, washers and bin gates but gives typical layouts for plants in both diagrams and photographs.

By correct design, the booklet explains, it is meant that each piece of equipment and each working part must be designed on sound engineering principles so that it will accomplish the work for which it is intended. By durable construction, is meant that every item must stand up under severe strains that are placed upon it in both its regular work and in emergencies. By consistent performance is meant the ability to handle continuously large quantities of material speedily and with the lowest amount of power and labor cost.

The manufacturers point out that their firm has been in the field continuously since 1855. Both the standard and heavy duty feeder are illustrated here and ample information is given as to their specifications and capabilities. Elevators and screens come in for a thorough discussion and diagrams show how the elevators and screens can be placed in relation to each other and to the bins.

Name and Address of Manufacturers of Equipment Mentioned May be Obtained from Publishers



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